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MUNICIPAL STREET CLEANING IN PHILADELPHIA

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JUNE, 1924

MUNICIPAL STREET CLEANING IN PHILADELPHIA

An Analysis of the Problem of Street Cleaning and Refuse Collection and Disposal, with an Evaluation of the Results Attained During the First Year of City-Wide Municipal Operation

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FOREWORD

The change from the contract system of street cleaning to municipal operation, which was begun on January 1, 1921, and completed a year later, is one of the most important events in the recent history of Philadelphia. An imposing task, requiring a huge organization of men and equipment and touching intimately the welfare of every resident, was taken, by this change, out of the hands of private individuals and added to the activities of our city government.

It was not without a struggle that this change was brought about. Many persons opposed it on the ground that the city would not do the work so well nor so cheaply as the contractors. The opposition, however, was not strong enough to prevent the adoption by the state legislature of 1919, as part of the so-called "new charter" act, of a provision decidedly favorable to municipal street cleaning. By this provision the city not only gained the power to employ its own street-cleaning forces, but was commanded to do so unless the mayor and council decided jointly to have the work done by contract. After the new charter went into effect, there followed a period of almost two years of doubt and hesitation on the part of the municipal administration. Largely through caution, the city began the new undertaking on a small scale, confining it at first to the central section of the city. The results in that section, however, proved most favorable, and on January 1, 1922, municipal street cleaning was extended to the entire city.

Now that Philadelphia has had actual experience with city-wide municipal street cleaning, ardent champions and doubters alike may well turn to that experience for light. It seems opportune, therefore, to analyze and evaluate the results that have been attained by the new method; to search out the major weaknesses in organization, personnel, plant, and equipment; and to point out how the city's operations may be improved.

Early in 1923, at the invitation of Frank H. Caven, at that time director of the department of public works, the Bureau of Municipal Research undertook this task. Throughout the study, the Bureau has had the fullest cooperation, first from Director Caven, later from his successor, Director George H. Biles, and from the personnel of the street-cleaning division. Mention should be

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made particularly of the assistance of John H. Neeson, formerly deputy chief of the bureau of highways, in charge of the street-cleaning division, now chief of the bureau of highways; and of Percy F. Proctor, now deceased, who for a time was in charge of the street-cleaning work. Grateful acknowledgment of these courtesies is hereby made.

The survey was conducted and the report prepared principally by James W. Follin, who until recently was the engineer of the Bureau's staff. Mr. Follin had followed the street-cleaning project since 1919 and had served as a member of the mayor's commission of engineers of 1920. When he left the Bureau to take up his new duties with the state highway department of Pennsylvania, Mr. Follin had completed his part of the survey, but the report was not yet in final form. Charles A. Howland, who succeeded Mr. Follin as the Bureau's staff engineer, has rendered valuable service in the completion of the report, particularly in the arrangement of the material. Robert J. Patterson, chief accountant on the Bureau's staff, has assisted as consultant on bookkeeping and accounting problems and on methods of controlling expenditures. The undersigned has studied the personnel problems of the street-cleaning division and prepared the chapter devoted to this subject.

WILLIAM C. BEYER
Director

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CHAPTER I

BACKGROUND AND OUTLOOK

The decision to place street cleaning and refuse collection and disposal in the hands of municipal forces was largely the outcome of past experience. It will help our understanding of the problem, therefore, to review briefly the history of street cleaning in Philadelphia.

History of Street Cleaning and Refuse Disposal in Philadelphia

As long ago as 1762, an act of the state legislature provided in elaborate detail for regulating, paving, and cleaning the highways of Philadelphia. This act, besides imposing a penalty for throwing rubbish or ashes into the streets, required the city to contract with private scavengers for weekly collection of rubbish and ashes and the removal of refuse from the streets.

From this beginning, the work was done by private contractors until 1921, exept for two periods. During the 14 years from 1826 to 1840, the city did its own street cleaning. At that time, we are told by historians, the city was famous, both at home and abroad, *as the cleanest city in America.* Will history be repeated, and the city acquire this enviable reputation again? The second period of municipal street cleaning began immediately after the city and county of Philadelphia were made coterminous by the Consolidation Act of 1854 and continued until about 10 years later, when contract work was reintroduced. In 1874, the legislature made contract work obligatory. Between 1854 and 1874, there was frequent shifting of the responsibility for the work in the city government, and there was apparently dissatisfaction with the methods used and the results attained.

The city cleansing services have been associated generally with highway work; for example, section 50 of the Act of Consolidation directed the city councils to organize a department of "highways, bridges, sewers and cleansing of the city." When the Bullitt Bill went into effect in 1887, the supervision of cleaning the streets and of collecting and disposing of household wastes became the duty of the department of public works. Even

under this more highly centralized and responsible administration, the supervision of contracts was constantly shifting. For two periods this function was vested in a separate bureau of the department, while during two other periods it was combined with paving and street-repair work. The contracts let for the work combined the street-cleaning and refuse-disposal services, and it naturally followed that these two services should be performed by the same division of the city government when the work was undertaken by municipal forces. Since October, 1920, the street-cleaning and refuse-disposal work has been done by the division of street cleaning, as a part of the bureau of highways in the department of public works, under the direction of a deputy chief.

Defects of Contract Work

Contract work involves the difficult problem of enforcing compliance with the specifications of the contract. This is particularly difficult in street cleaning, requiring as it does a number of more or less irregular operations necessitated by the constantly varying traffic, and climatic and local conditions, for which it is impossible to prepare definite specifications. Moreover, as the results to be obtained are intangible and the degree of cleanliness demanded is difficult to specify, constant inspection of the work of each unit of the organization is necessary. Adequate inspection by the city of the work of the contractor, besides being practically impossible, would be extremely expensive to attempt and would result in a duplication of the overhead charges for which the citizen must pay. On the other hand, the way is open for the contractor to reap exorbitant profits by cutting every corner. It is decidedly to his financial interest to control the city's supervisory forces, hence the contract system introduces a baneful influence into municipal politics. Under the plan of making contracts for one year only, which the city followed, competition among bidders was almost non-existent, and new bidders hesitated to enter the field. A contractor had to make the necessary outlay, with a certainty of only one year's operation, in addition to the uncertainty of the attitude of the city's supervising forces.

From 1912 to 1916, a determined effort was made to revise the specifications so as to fix more definitely the work to be

performed, while at the same time more complete compliance with the specifications was demanded. New requirements were introduced, such as the one defining the minimum equipment and labor to be employed, and numerous devices were used to check the performance. One device was the "flying squadron," which for a time was employed to swoop down unheralded upon the contractor's forces in the several districts. However, the temporary advantages gained by these more strenuous efforts at supervision were so small and the fundamental defects of the contract method were so great that the results attained were still unsatisfactory.

The collection and disposal of refuse by contract was found to have the same basic faults as contract street cleaning. It was equally difficult to devise means of supervision and enforcement which would insure efficient operation. In addition, it was specially hard to obtain the cooperation of the householder with the contractor. This personal relation of the citizen to the collection work is an important factor and will be discussed in detail later. At this time it is sufficient to say that the refuse-disposal service obtained under the contract system was unsatisfactory, and no means were found to place the work on an efficient basis.

In the end, civic effort was concentrated upon the elimination of the contract method, and the substitution of municipal forces working under the control of city officials, which is the method employed in practically all large American cities. Owing to the fact that the city government operates within the narrow bounds of authority granted by legislative enactment, and that the legislature had not expressly authorized the city to employ its own forces to clean the streets and collect and dispose of refuse, it was necessary to obtain this authority.

A bill granting this power was introduced into the legislature in 1917, but failed of passage. The cause of municipal street cleaning, however, was championed not only by the citizens' charter revision committee of 1917, at whose request the bill was introduced, but also by the citizens' charter revision committee of 1919. In fact, municipal street cleaning became a major issue that was fought and won in the 1919 legislature. Not only did the city gain the power to employ its own street-cleaning forces, but it was commanded to do so unless the city

council and mayor jointly decided to award contracts in whole or in part. This change in the law destroyed the rigidity of the act of 1874, previously referred to, which had not only compelled contract performance, but practically had limited the contract period to one year. If the city should now desire to contract for any or all of the cleansing operations, it is empowered to contract for long terms without being forced to make an appropriation in advance sufficient to cover the entire contract period. While the law gives preference to direct municipal operation, the city is empowered to determine its own policy at any time.

Municipal Operation Introduced

The city administration which took office on January 5, 1920, was bound under the charter to initiate municipal street cleaning on January 1, 1921, unless the city council and the mayor agreed in the meantime to continue contract work in whole or in part, and to advertise for bids prior to August 1, 1920. Accordingly, the year 1920 was a year of decision-making and of preparation. To aid in determining the best policy, the mayor sent a commission of engineers [1] to a number of other cities to study and report upon the street-cleaning and refuse-disposal operations. The unanimous recommendation of this commission was that the city undertake the work of cleaning the streets and collecting and disposing of household wastes with its own forces. There was, however, some slight disagreement concerning the speed and manner in which this important change should be made. In view of several uncertainties that had arisen and of the unformed state of administrative policy, contract bids for 1921 were requested practically upon the old basis. It was decided finally to introduce municipal street cleaning and refuse disposal in two of the 13 districts, these two comprising the central city area (Columbia Avenue to South Street between the two rivers). Contracts for one year were let for the remainder of the city.

On January 1, 1922, direct municipal operations were extended to the entire city with practically unanimous consent. At

[1] Composed of E. B. Morden, then chief of the bureau of street cleaning; J. H. Neeson, then principal assistant engineer, bureau of highways; and J. W. Follin, engineer, Bureau of Municipal Research. Their report will be found in the appendix (vol. II) of the Journal of the City Council of Philadelphia, 1920, page 244, and in the Journal of the Engineers' Club of Philadelphia for August, 1920, page 326.

least there was no opposition apparent on the surface, although there had been a realignment of political forces. When the administration attempted to terminate the 1921 contracts on October 1, in accordance with an optional provision of the contract, the city council objected, but voted almost immediately thereafter the sums needed to acquire additional plant and equipment for city-wide municipal operation. Council also made no use of the optional authority given by the charter to advertise for contract bids for 1922. It is worth while to mention that an attempt was frustrated in the 1921 legislature to make the advertising for bids obligatory rather than optional. Such a change would have reopened each year the question between contract and municipal operation, and thus supported and encouraged those who would contract for these services without regard for the best interests of the city.

The Scope of the Street-Cleaning Operations

In this day there is almost universal recognition of the duty of city governments to keep the streets clean, to collect household waste, and to dispose of this waste quickly and inoffensively. This service constitutes one of the most essential functions of the city government, and perhaps the most troublesome, because it touches the citizen personally at nearly every turn. The streets are the show windows of the city, and any neglect in keeping them well paved or reasonably clean is apparent to all who use them, but particularly to visitors. The householder is especially interested in the condition of the street in front of his own residence. Although he may not be doing his part to keep the street clean, he nevertheless expects that it will be clean at all times. The collection of waste, particularly of garbage, is perhaps more of a personal matter with him than is the street-cleaning work. But, if the household waste is collected frequently and in accordance with a fixed schedule, the householder usually gives little or no thought to the manner of its disposal, unless he resides near a refuse dump or other place of disposal.

Extent of the Work

The task of furnishing this service to the citizens of Philadelphia is perhaps little appreciated. The population to be served numbers almost 1,900,000, consisting of over 400,000 families,

who live in over 352,000 dwellings, each with its individual collection of household waste. These families live on 1,800 miles of streets and roads, 1,600 miles of which are paved, and many miles of which are so poorly paved that they are difficult to clean and to keep clean. In the rear of properties, there are 210 miles of so-called alleys, or narrow walkways, three or four feet wide, which are difficult to clean, but which, nevertheless, must be kept clean. The city is alive with industrial and commercial activities which in many sections contribute heavily to the dirt in the street. The horse is still used for trucking purposes in Philadelphia to a greater extent than in many other large cities. Philadelphia has large districts occupied by the foreign-born, and in these sections activities upon the streets are pronounced, littering of the streets extensive, and cooperation from the householder almost negligible. In these sections are found curb markets which greatly aggravate the difficulty of keeping the streets clean.

During 1922, the street-cleaning division collected 1,795,557 cubic yards of ashes and rubbish, weighing nearly a million tons. If this refuse were placed on the tract of land covered by City Hall (approximately 470 feet by 486.5 feet), it would rise to a height of 210 feet, which is greater than the building proper and equal to 60 per cent of the height of the clock tower. An average of 2½ tons of ashes and rubbish are collected from each residence during the year, the greater weight of which is contributed by the ashes from October to May. During the year 1922, there were also collected in the city 217,000 tons of garbage, an average of about 225 pounds to each household.

Local Handicaps

These 1,200,000 tons of household waste are collected under the greatest of handicaps. The city is almost entirely without team alleys, and curb collection of ashes and rubbish is the rule. Thus the householder must place his receptacles at the curb at great personal inconvenience, while the collection costs are also increased by the necessity of making separate trips down each side of the street. The collection process itself is certainly not an adornment to a residential street. Moreover, the household refuse is placed where it certainly does not belong, upon the public street, to be a source of litter and dirt even under the

best conditions—that is, when tight receptacles are used and loading is done carefully.

Garbage is collected under even more unfavorable circumstances. The footways called alleys, while not wide enough to permit the carrying of ashes and rubbish through them, can be used for collecting the smaller quantities of garbage. However, numerous and long trips must be made by the collectors, thus greatly increasing the cost over what it would be if there were team alleys through which the garbage wagons could be driven. It is estimated that between 60 and 70 per cent of the garbage is collected through these narrow footways, while the remainder must be placed at the curbs for collection.

The problem of keeping 1,600 miles of paved streets clean would be much simpler if temperature and climatic conditions were more uniform during the 12 months of the year, so that a fairly constant working force could be kept occupied. Under the climatic conditions that exist, however, and with the cleaning methods that are in use, the size of the working force varies radically during the several seasons, while the more efficient cleaning can be done only during the warmer months when water can be used. There is, of course, a markedly seasonable production of ashes which reaches a peak in February and March. Garbage, on the other hand, is at low production during the winter months, and is produced in greatest quantity during August and September. The working forces assigned to street cleaning, ash and rubbish collection, and garbage collection must, therefore, be constantly adjusted to the conditions. Fortunately they can be so regulated that a fairly uniform labor force and a somewhat less uniform amount of equipment can be employed continuously, although the demands of the collection services, which must be given first consideration, frequently operate to the disadvantage of the street-cleaning work proper.

Size and Cost of the Street-Cleaning Organization

Approximately 3,000 persons are ordinarily employed in the street-cleaning division. With almost monotonous regularity this force goes about its daily work; every morning some 700 wagons of all classes, and 50 2½-ton trucks start out from the various stations for refuse collection, and approximately 450 men assume their duties as blockmen or "white wings," and others assist in

loading ashes, rubbish, or garbage. Fifty-eight machine-broom gangs, ranging from 7 to 12 men in a gang, take up their positions behind the cavalcade of ash and rubbish wagons, or start on the regular cleaning schedules for the day, and over 100 dirt wagons trail the cleaning gangs for the collection of accumulated street dirt. If the weather permits, 26 motor flushers work a double shift in washing the smoother pavements. In all, over 1,000 pieces of major equipment are used in the work, and nearly 2,000 horses and mules.

The public is perhaps better acquainted with the street-cleaning and refuse-collection facilities than it is with the equipment for refuse disposal or with the small army of mechanics and laborers behind the lines. These branches of the service are none the less highly important parts of the organization. After the refuse and street dirt has been collected it must be disposed of economically and inoffensively. Some kinds of refuse can be used, or profitably prepared for use, while other kinds have no value whatever and must be gotten rid of in a satisfactory manner.

To keep the services which the public sees operating smoothly, draft animals must be housed, fed, and rested; horse-drawn and motor equipment must be repaired and reconstructed, and supplies must be obtained and distributed. For these purposes shops must be maintained and equipped, stables provided, and the multitude of other activities kept in operation.

In addition, the general administrative machinery must be kept working smoothly. The payrolls must be prepared and the men paid; control must be exercised over expenditures; and the work of the whole organization must be coordinated and planned so that the streets will be cleaned and the refuse collected and disposed of as efficiently and economically as possible. Each part of the huge machine must function properly; but this is not possible unless there is a hand on the throttle and a watchful eye upon the whole machine to see that each cog and shaft performs its proper service.

The work of the street-cleaning division costs approximately $5,000,000 a year, one of the largest expenditures that is made for any municipal service. Because it represents over 8 per cent of the city's annual revenue, or over $2.50 per capita a year, it is an important consideration in fixing the tax rate.

To manage an operating organization of this kind is a task of the first magnitude. With its extensive equipment, its huge personnel, its large expenditures, and its daily contact with all classes of our two million inhabitants, the street-cleaning division requires a high order of technical supervision and executive direction.

Appraisal

The question foremost in the mind of the city official or the citizen is whether the municipal street-cleaning undertaking as a whole has been a success or a failure, whether progress has been made, and whether further progress can be expected. For the benefit of the busy man or woman who may not have the opportunity to read this report in its entirety, the more important observations, deductions, and recommendations are brought together in this chapter.

Change to Municipal Operation

The change from contract to municipal operation was accomplished in a noteworthy manner, reflecting credit upon the higher officials of the department of public works, who have devoted themselves untiringly and at considerable sacrifice to the task, and upon the numerically inadequate group of supervisory and staff officials within the division of street cleaning, who carried a heavy load with a zeal that is most commendable. Equipment had to be acquired and assembled, live stock had to be purchased and provision made for its housing and care, shops had to be provided, and extensive arrangements made for the disposal of refuse. In this process a considerable amount of used equipment that was not very useful was purchased from the contractors at comparatively low prices. Above all, it was necessary to enlist the services of an operating force, many of whom were employed by the contractors up to the very day when the change was made, and to start this operating force under a new management without interruption to the service which the citizen expected. All this was done with dispatch and without confusion.

Standard of Service

Equally commendable has been the subsequent performance of the city. An excellent barometer for testing the results of the

street-cleaning service is the comment of the press and of the citizens in general, particularly as expressed in complaints received. The readings of this barometer have been favorable. There has been a keen desire on the part of the department of public works to maintain a high standard of service. To that end both the equipment and personnel have been increased.

It has not been possible, however, to overcome all difficulties nor to perfect the processes in the short period of municipal operation. Since the autumn of 1922 until late in 1923, the labor shortage was acute. In the eyes of the observer, the street-cleaning operations have improved in quality, but have not yet reached the expectations of the public. The department has realized fully the necessity for fundamental revision and reorganization, and made important changes in the entire area of West Philadelphia in 1923, but thorough-going studies by the engineering staff are proceeding slowly owing to inadequate staff personnel.

Permanent Plant

Much study has been devoted to the major problem of the disposal of ashes, rubbish, street dirt, and garbage. The first incinerating plant is now under construction and holds great possibilities. It will, however, mark only a beginning in the solution of a most vexatious problem.

The city has spent considerable money in the improvement of the generally unsatisfactory stables that were rented, mostly from the street-cleaning contractors—some at rather high rentals. It is a question, however, whether the city has not gone too far in its expenditures on property leased for a comparatively short time, and a decision should be made before further sums are applied in this manner. A new municipal stable of modern construction and with modern equipment has recently been built near Twenty-seventh and Diamond Streets.

Expense

While the quantity and quality of the work performed have been improved, the expense to the taxpayer has not increased. The total expense in 1922 for street cleaning and refuse collection and disposal (not including direct payments to contractors for snow removal) was $5,140,615.22, which was nearly a million

dollars less than the expense of combined contract and municipal work in 1921, and even less than the estimated expense of $5,160,-874.22 for full contract work in 1920. If we allow for the drop in price levels from 1920 to 1922, but assume that the contractors would have provided the increased facilities (in equipment and personnel) used by the city in 1922, we arrive at the conclusion that the expense by contract in 1922 would have been at least $5,265,000, with no assurance that the work would have been entirely satisfactory.

Under municipal operation, of course, the taxpayer will never pay any more than the actual cost of the work, thus eliminating the contractor's profit and the amount charged by the contractor for assuming the risks of changing labor and material prices and other unforeseen difficulties.

Recommendations

The major recommendations developed from the analysis in the following chapters are:

1. A detailed study of the whole problem by specialists, particularly a study of permanent methods for disposing of ashes, rubbish, street dirt, and garbage, and of methods for providing such permanent facilities as stables, garages, and repair shops for street-cleaning work and refuse collection.

2. The provision of an adequate sum—estimated at $2,500,000—for acquiring these permanent facilities.

3. Complete consolidation of the street-cleaning division with the highway division in the highway bureau, placing the execution of street cleaning and refuse collection under the direct supervision of the district highway engineers, thus bringing to bear upon the conduct of this work the entire engineering skill of the bureau of highways.

4. Provision of more adequate supervisory and staff personnel (to include immediately two division engineers, each in charge of a group of highway districts), a doubling of the engineering personnel, and an educational and publicity supervisor.

5. Increase of rates of compensation for labor, and other changes in the conditions of employment to improve the *esprit de corps.*

6. Better uniforming of the street forces, including the restoration of white uniforms for blockmen.

7. A continuous educational and law-enforcement campaign.

8. More complete financial records and absolute control over plant and equipment. (These subjects are already under advisement by the division.)

9. Budget allowances for the division of street cleaning sufficient to maintain plant and equipment and make replacements.

Outlook

It is not likely that any movement which had for its purpose a return to the contract system would receive much support. It is all too clear to those who are in touch with conditions that such a return would be a step backward. The improvement of the service would come to an end at once, and the city would be helpless to solve the major problem of refuse disposal, which is now very pressing. Under the contract system there may have been a greater incentive to effort in the operating organization, but there was also the tendency to sacrifice results to personal gain. There are ways and means to provide incentive in the municipal organization. While the work has been new, the city's forces have been stimulated by the desire to produce good results; but unusual effort may be necessary in the future, in view of the more or less monotonous regularity of the daily work, to keep the organization "on its toes."

The municipal organization may become inert, perhaps even infected with politics, and there may be demands for a change. It should be remembered, if any such occasion arises, that the numerous disadvantages that have been found in the past as a part of the contract system are rather a high price to pay for whatever increased incentive there may be under a contract system operated for profit. It seems highly improbable, if the division of street cleaning is to be operated as a part of the engineering service, that it will ever fall into utter disrepute; but those who are interested in seeing that the street-cleaning and refuse-disposal services are efficient, must be watchful lest these services be starved by inadequate appropriations, which is the quickest

and most effective way of bringing them into disfavor. To provide satisfactory service, adequate personnel must be employed, equipment must be repaired and replaced, and the plant generally must be maintained and enlarged. If a criticism can be made, it is that the 1923 budget was cut too close to the bone, and the continuance of so small an allowance may seriously jeopardize the progress that has been made, while further reductions would prove disastrous. Most certainly, until the operations of the street-cleaning division are scientifically worked out and placed on a permanent basis, the budget should be more flexible and more adequate than it was in 1923, thus permitting a thorough trial of new methods and schedules.

CHAPTER II

ORGANIZATION, PLANT, AND EQUIPMENT

General Organization

The highway work of the city is performed by the bureau of highways of the department of public works under the supervision of the chief of the bureau. The construction and maintenance of highways is controlled by the division of highways of the bureau of highways, headed by a deputy chief under whom are six district highway engineers. A second deputy chief supervises twelve district street-cleaning superintendents of the division of street cleaning who have charge of the cleaning of streets and the collection and disposal of ashes, rubbish, and garbage, independently of the district highway engineers.

In chart I is shown the general organization of the division of street cleaning. The deputy chief supervises directly the activities of the twelve district superintendents, the superintendent of motor equipment, the superintendent of shops, the superintendent of garbage collection, the general superintendent of horses, the superintendent of the garbage-reduction plant, the superintendent of the incineration plant and the superintendent of accounts—in all, nineteen different superintendents. On the staff of the deputy chief is an assistant engineer who supervises a small force of engineers and inspectors engaged in studies of the methods used in street cleaning and ash and rubbish collection. There is a second assistant engineer who performs the same work for the garbage-collection service. The authority of these engineering assistants is not very clearly defined. In some cases they may issue orders directly to district superintendents, in others not. The deputy chief also has an inspector who investigates accidents, and another who investigates complaints made to the central office and supervises the work of the complaint inspectors assigned to each district.

Districts

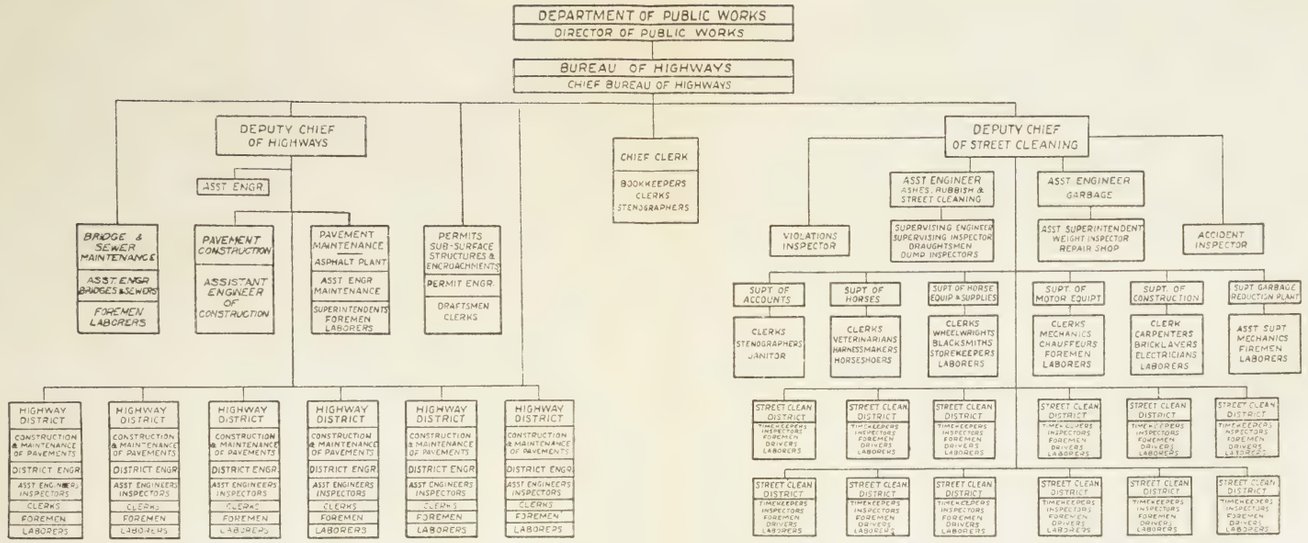
For the purpose of performing the street operations of the street-cleaning division, the city area is divided into twelve dis-

CHART I

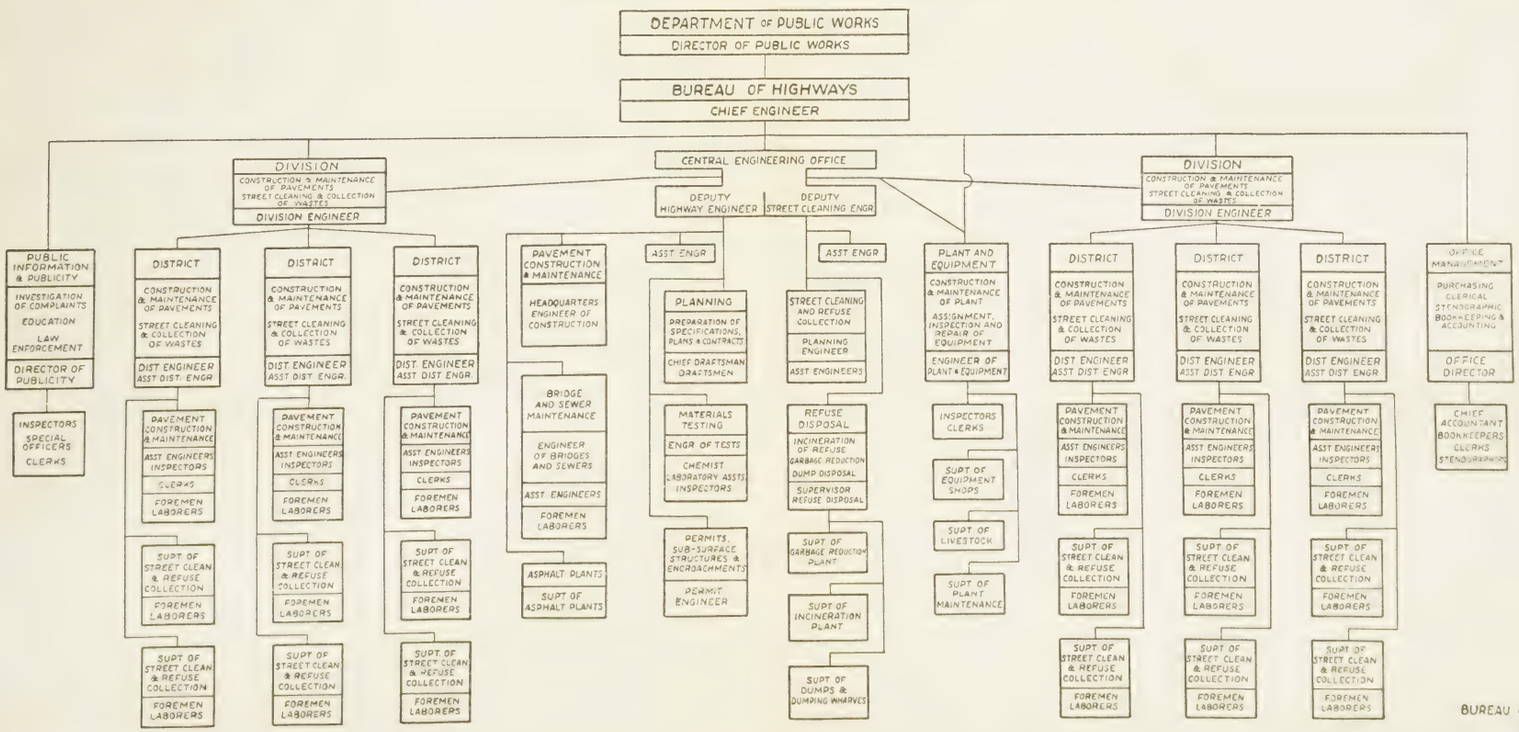
ORGANIZATION OF BUREAU OF HIGHWAYS

PHILADELPHIA, PA.

EXISTING ORGANIZATION 1923.



RECOMMENDED ORGANIZATION



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tricts of various sizes. These districts are defined by more or less natural boundaries which do not necessarily coincide with the boundaries of wards or other political subdivisions. Extensive changes were made in the district boundaries in 1921 when municipal work was introduced in two districts, and other changes were made in 1922 and 1923. Additional modifications may be expected in the next few years as comprehensive studies are completed of the street operation and of the amount of work to be performed. It is necessary to balance the mileage of streets to be cleaned and the quantity of refuse to be collected against the facilities available, such as stables and points of refuse disposal. The boundaries of street-cleaning districts will be subject to change until stable, shop, and refuse-disposal facilities have been permanently located.

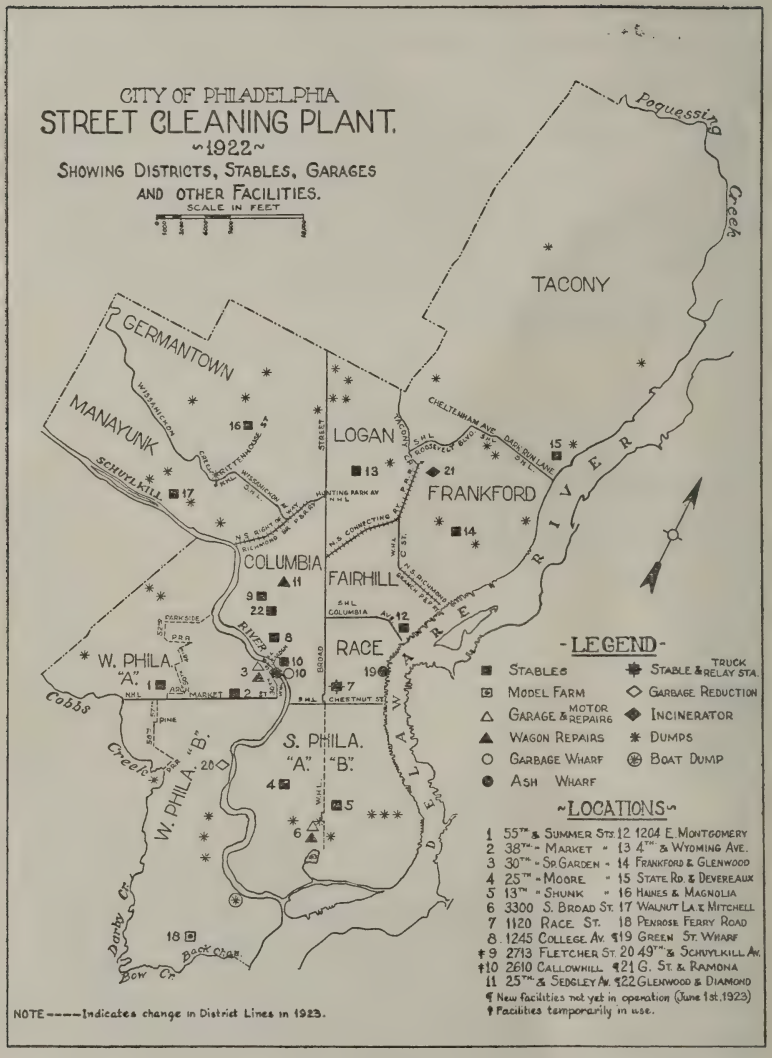
TABLE II-1

POPULATION OF STREET-CLEANING DISTRICTS OF 1922
(1920 Census Population Plus 4 Per Cent)

West Philadelphia A (N. of Market)	185,700
" " B (S. " ")	188,900
South Philadelphia A (W. of Broad)	195,600
" " B (E. " ")	249,500
Race	258,700
Columbia	181,500
Fairhill	206,500
Frankford	143,200
Tacony	37,000
Logan	103,000
Germantown	107,900
Manayunk	42,500
Total	1,900,000

Chart II shows the street-cleaning districts as established in 1922 and also the two important changes in boundaries effective January 1, 1923. Table II-1 shows the populations in the various districts in 1922. The very large area of South Philadelphia below Chestnut Street has been divided into east and west districts separated by Broad Street. West Philadelphia, instead of being divided into north and south districts by Market Street, is now divided into east and west districts by a most irregular boundary line. While at first glance such a boundary line may appear incorrect, it was fixed as a result of an intensive study

CHART II


CITY OF PHILADELPHIA
STREET CLEANING PLANT.
~1922~
SHOWING DISTRICTS, STABLES, GARAGES
AND OTHER FACILITIES.
SCALE IN FEET
Poquessing Creek
TACONY
GERMANTOWN
MANAYUNK
LOGAN
FRANKFORD
COLUMBIA
FAIRHILL
RACE
W. PHILA. "A."
W. PHILA. "B."
S. PHILA. "A." "B."
DELAWARE RIVER
Cobbs Creek
Darby Cr.
Back Cr.
Bow Cr.
SCHUYLKILL
CHELTENHAM AVE.
MARKET ST.
CHESTNUT ST.
COLUMBIA AV.
PENNSYLVANIA R.R.
PHILA. & READING R.R.
-LEGEND-
STABLES
MODEL FARM
GARAGE & MOTOR REPAIRS
WAGON REPAIRS
GARBAGE WHARF
ASH WHARF
STABLE & TRUCK RELAY STA.
GARBAGE REDUCTION
INCINERATOR
DUMPS
BOAT DUMP
~LOCATIONS~
1 55TH & SUMMER STS
2 38TH ~ MARKET ~
3 30TH ~ SR GARDEN ~
4 25TH ~ MOORE ~
5 13TH ~ SHUNK ~
6 3300 S. BROAD ST.
7 1120 RACE ST.
8 1245 COLLEGE AV.
*9 2713 FLETCHER ST.
†10 2610 CALLOWHILL
11 25TH & SEDGLEY AV.
12 1204 E. MONTGOMERY
13 4TH & WYOMING AVE.
14 FRANKFORD & GLENWOOD
15 STATE RD. & DEVEREAUX
16 HAINES & MAGNOLIA
17 WALNUT LA. & MITCHELL
18 PENROSE FERRY ROAD
19 GREEN ST. WHARF
20 49TH & SCHUYLKILL AV.
¶21 G. ST. & RAMONA
¶22 GLENWOOD & DIAMOND
¶ New facilities not yet in operation (June 1st, 1923)
† Facilities temporarily in use.
NOTE----Indicates change in District Lines in 1923.

of the conditions in West Philadelphia. This method of subdivision creates no difficulties for citizens, because they need not be familiar with the boundaries of the district in which they reside. Their contact is directly with the central office at City Hall. Furthermore, it is advisable for the best interests of the service to disregard division and ward lines in laying out street-cleaning districts.

District Organization

The work in each district is under the direct supervision of a district superintendent. Upon him depends to a marked degree the success attained. He has his office at the stable from which the activities in his district radiate, and keeps in touch with the working force by use of a motor car. The execution of the work is entrusted to foremen and sub-foremen. In each district there are foremen, in charge, respectively, of street-cleaning work proper, of ash and rubbish collection, of garbage collection, of dumps, and of stables. Sub-foremen are placed in charge of the subdivisions of these activities, such as gangs operating on the different collection routes. There is also the necessary quota of truck drivers, ash-, rubbish-, and dirt-wagon drivers, garbage-wagon drivers, machine-broom and sprinkler-wagon drivers, collection helpers, dumpmen, gangmen, inlet men, blockmen or "white wings," stablemen, blacksmiths, blacksmith's helpers, and a few men engaged in making minor repairs to equipment.

Each district office employs a timekeeper and a clerk, who keep the records from which the payroll is prepared, make out reports, and do the clerical work incidental to appointments, discharges, and approval of bills. There is also an inspector who investigates complaints of derelictions in service or violations of ordinances. The timekeeper, clerk, and inspector are, in reality, part of the general administrative force operating under the superintendent of accounts, at City Hall, although they are under the disciplinary control of the district superintendent. At present, the district superintendents are not provided with an adequate force of foremen and sub-foremen, particularly sub-foremen. If work by blockmen is to be increased, there must be more adequate supervision by sub-foremen, or the work will be ineffective and unsatisfactory. Effective supervision can be more readily exercised if the supervisory forces are provided with sufficient trans-

portation. Motor cars are now furnished to a number of the principal supervisory and staff officers, and each district superintendent has a motor car without driver. Some foremen and sub-foremen are provided with horses and buggies, but others have none. To obtain the best results, the foremen of major operations should be provided with motor cars or motorcycles, and other foremen and possibly some sub-foremen with bicycles.

Auxiliary Services

To prevent interruption of the street operations, it is necessary to maintain the equipment in good repair. Small forces are occupied in each district with minor repairs, but the more important work is done in regularly equipped shops.

Maintenance of Motor Equipment

Major repairs are made and motor equipment is reconstructed in two shops, one at Thirtieth and Callowhill Streets, the other at 3300 South Broad Street. This service is in charge of the superintendent of motor equipment, who, with the necessary complement of clerks, has offices at the former shop. The city has provided fairly complete equipment for motor repairs and carries on its payroll the motor mechanics and other labor necessary for this work.

The superintendent of motor vehicles is responsible for the operation of all motor equipment, which is assigned to the several districts as needed. Records are kept of the use of each piece of motor equipment and of the repairs and supplies necessary. The motor equipment is most important, and, in the interests of economical street operation, it is essential that it be kept in constant use. The records which are kept of motor-vehicle use should prove of inestimable value as guidance when new equipment is bought or supplies purchased.

Maintenance of Horse-Drawn Equipment

Shops for the repair and rebuilding of horse-drawn equipment are maintained in conjunction with the motor shops and are in charge of the superintendent of horse equipment and supplies. These shops are fully equipped to make major repairs, and even to manufacture new equipment. During 1922, about fifty new ash wagons were made. The city can be sure of the

best material and good workmanship in equipment which it makes in its own shops; but it is doubtful whether these shops can compete in price with larger commercial wagon shops. This question, which time did not permit us to analyze in detail, should be studied fully in order that the city may adopt the most satisfactory method. Even if the city does not construct new wagons, there will always be sufficient reconstruction and major repair work to make wagon shops essential; and such facilities, of course, make it possible to experiment with new designs.

Garbage wagons are repaired and painted at a shop at Twenty-fifth Street and Sedgley Avenue under the direction of a wheelwright foreman. This shop, however, does not have sufficient equipment and personnel to make all woodwork repairs while the iron bodies are being overhauled. The wagons, therefore, are transferred to the wagon shops for part of the repair work.

Shops

All of the property used as shops for the repair of horse-drawn and motor-drawn equipment is leased, except the garbage-wagon shop at Twenty-fifth Street and Sedgley Avenue. The property at Thirtieth and Callowhill Streets is owned by the Schuylkill Navigation Company, and is leased by the city from year to year at an annual rental of $10,000. It is improbable that the present owner would willingly sell the property, but it may be condemned by the city for park purposes, in which event the shops located there must be moved. The property at 3300 South Broad Street is held under a five-year lease at an annual rental of $10,000. The buildings are of little value and it is doubtful whether the location is desirable as a permanent one for shops.

The irregularly shaped piece of ground at the corner of Twenty-fifth Street and Sedgley Avenue was acquired with the purchase of the garbage-reduction plant. A dilapidated brick building, only partially roofed over, which had been used for some years as a storage place and repair shop for garbage wagons, stands on this property. The repair equipment is not very complete; but owing to the fact that a modern shop may be constructed at this location, only temporary improvements have been made, or are proposed for the present. This shop is valued at $10,000 on the books of the street-cleaning division. The prob-

lem of providing permanent and adequate shops, either independently of or in conjunction with other city bureaus, must be given early attention by the city.

Care of Horses

A superintendent of live stock is responsible for the housing, feeding, resting, and handling of the animals. Daily inspections are made by veterinarians who are employed on a contract basis and are paid at a rate per horse per year. The veterinarians are under the direction of a head veterinarian who has quarters at the city's model farm. Medicines are furnished by the city. At the model farm there is a fully equipped horse hospital, while at the several stables some special arrangements are provided for sick horses.

At each stable there are facilities for horseshoeing and for the repair of harness. Early in 1924, the chief of the bureau of highways announced that the division of street cleaning could not shoe its horses as economically as it could have them shod by contract. Subsequently a contract was let for this work. If the city requires work of quality equal to or better than its own work, it is surprising and regrettable that the contractor, who must make a profit, can do it more cheaply.

The superintendent of live stock has an office in the rented building at 1120 Race Street, and has a clerical force to maintain the animal-service records.

Storehouse and Supply Service

At Twenty-fifth and Master Streets, a discarded city bathhouse has been converted into a storehouse for supplies and materials used in the street-cleaning operations, and also in the highway-repair work. A storekeeper is in charge, and several laborers are employed in receiving and issuing materials. Supplies are delivered every day to the various stables and other places, which makes it unnecessary for these units to maintain large individual stocks of the supplies. The supply service is directed by the superintendent of horse equipment and supplies.

Clerical and Accounting Service

A superintendent of accounts located in the central offices at City Hall is responsible for the conduct of the clerical and accounting work that is performed there, and also supervises the

work of the timekeepers and clerks who are assigned to the district offices. The work at the central office includes the usual typing and stenographic service, the clerical routine incidental to the employment and discharge of laborers, the receiving of complaints, and the more detailed and important work of bookkeeping and cost accounting.

Plant and Equipment

Plant Acquired

The provision of the necessary plant and equipment has been a problem of the first magnitude. To a considerable degree, the city depended upon the acquisition and development of such facilities as were already used by the contractors. This, of course, was a logical step; but, unfortunately, stables and certain other plant facilities were leased instead of purchased. To the extent that the contractor's equipment was usable, it was to the best interests of all concerned that the city should acquire it, even though the city was under no obligation to do so.

After the decision had been made to initiate municipal work in the central district of Philadelphia on January 1, 1921, the city council appropriated the sum of $400,000 for the purchase and erection of plant, buildings, ground, and equipment. The city had previously requested bids for the furnishing of horses and used equipment, and had received bids from practically all the contractors. Bids had also been obtained on new equipment, and, after consideration of the two groups of bids, sufficient equipment was purchased to handle the limited municipal work begun in 1921.

At the election held on November 2, 1920, the electors approved the creation of a loan or loans not exceeding $33,000,000, of which sum $1,000,000 was designated for the acquisition of plant for the division of street cleaning. Of this latter amount, $500,000 was used in accordance with an ordinance of February 8, 1921, to purchase the garbage-reduction plant, garbage wagons, and the garbage-wagon repair shop. Appropriations have been made from the remaining $500,000 for the erection of an incinerating plant and a stable. These projects will entirely exhaust the loan authorization.

On August 10, 1921, the city council appropriated from the general fund (as temporarily increased by an emergency loan)

TABLE II-2

RECORD OF EQUIPMENT PURCHASED DURING PERIOD FROM OCTOBER, 1920, TO DECEMBER, 1922, INCLUSIVE

Kinds of equipment	New and used		New equipment		Used equipment	
	No.	Cost	No.	Cost	No.	Cost
Total	2295	$891,411.18	1439	$746,213.18	856	$145,198.00
Flushers	23	177,113.10	23	177,113.10	..	..
Trucks, 5-ton	33	130,394.39	22	108,394.39	11[1]	22,000.00
Trucks, 2½-ton	52	174,001.85	41	152,056.85	11[2]	21,945.00
Tractors, 5-ton	1	3,750.00	1	3,750.00	..	..
Tractors, 10-ton	2	12,894.30	2	12,894.30	..	..
Motor sweepers	2	14,171.04	2	14,171.04	..	..
Passenger automobiles	19	19,835.00	19	19,835.00	..	..
Truck bodies, 5-ton	5	750.00	..	..	5	750.00
Snow loaders	2	10,993.00	2	10,993.00	..	..
Snow plows	35	9,530.00	35	9,530.00	..	..
Truck trailer	1	1,775.00	1	1,775.00	..	..
Wagons, wood	699	196,424.50	336[3]	144,722.50	363	51,702.00
Wagons, iron	114	41,820.00	80	36,600.00	34	5,220.00
Wagons, iron, garbage	300	30,000.00	..	..	300	30,000.00
Wagons, drop bottom	10	1,000.00	..	..	10	1,000.00
Wagons, sprinkling	84	25,740.00	50	22,015.00	34	3,725.00
Machine brooms	159	32,815.00	75	23,975.00	84	8,840.00
Blockmen's carts	754	8,404.00	750	8,388.00	4	16.00

[1]Eleven 5-ton used trucks bought in 1920 for $22,000 traded in at an exchange value of $13,200 on the purchase of eleven 5-ton new trucks for $58,129.77 in 1921.

[2]Eleven of these trucks bought in 1920 for $21,945; in 1921, two traded in at an exchange value of $3,000 on the purchase of forty new trucks for $151,150.

[3]Capacity without sideboards, generally 3¾ cu. yds.; with sideboards approximately 5 cu. yds.

the sum of $1,250,000, comprising varying amounts earmarked for definite kinds of equipment, improvements to leased property, and consulting services. The department of public works was given somewhat broader use of this money by an ordinance of November 28, 1921. In the following year council made certain transfers between items. These transfers were made to meet readjustments in the plans for purchasing equipment and to provide additional money for improvements to stables. At the close of 1922, this appropriation was practically exhausted, and the division of street cleaning was left dependent upon a relatively small appropriation for replacement of equipment.

Street Equipment

Table II-2 shows the quantity and purchase price of new and used equipment of the several kinds acquired from October, 1920, to December 31, 1922. Including major and minor items, 2,282 pieces of equipment were purchased at a cost of $891,411.18. It is apparent from an examination of this table that although a rather large quantity of used equipment was purchased, new equipment actually predominated. Practically all the motor vehicles now in use were new when purchased. The city did not buy any used motor flushers, and while 11 used five-ton trucks were acquired in 1920, they were later traded in for new trucks. Approximately one-half of the machine brooms and sprinkling wagons, and two-thirds of the iron-body wagons used in the collection of street dirt, were new when purchased.

More than 50 per cent of the wooden wagons purchased for the collection of ashes and rubbish had been used by the contractors. They were bought at an average price under $150, which is a little more than one-third of the average price of over $400 for new wagons. Many of the old wagons have already been discarded, or have been completely rebuilt. Some were never used by the city. In fact, the total number of new ash and rubbish wagons, machine brooms, and sprinkling wagons on hand has been almost sufficient to meet all needs, so that the city has not depended to any appreciable extent on the used equipment. The money paid for the old wagons may be regarded as part of the cost of changing from one system of street cleaning to another.

But little equipment has been rented by the city. The use of 12 five-ton trucks was contracted for in the winter of 1922-1923 for ash and rubbish collection in West Philadelphia, to carry out the revised schedules which had been prepared after detailed study. Each of these trucks cost $18.08 a day with driver, while the total expenditure for this purpose did not quite equal the maximum of $20,000 appropriated by council. Additional trucks are badly needed at present, particularly in view of the inavailability of dumps within convenient distance.

The 300 garbage wagons included in the purchase of the garbage-reduction plant, and valued by the bureau of highways at $40,000, have undergone extensive repairs, and with occasional

help from trucks have so far met the needs of the garbage-collection service. However, the number of wagons in reserve at certain times has hardly constituted a safe margin. After 23 of the total number were discarded as unfit for use, there have been available 277 wagons, 259 of which are of the larger steel-body type having a capacity of 3,100 pounds each, or from 3¼ to 3⅓ cubic yards. They are designated as the 1¾-ton type. The remaining 18 wagons have smaller steel bodies, with a capacity of 2,500 pounds each, or about 2¼ cubic yards. They are designated as the one-ton type. As many of these wagons have been in service from 15 to 27 years and the wheel boxes and axles are of varying sizes, it is difficult to interchange wheels in case of mishap. Undoubtedly the design can be improved as replacements are made. The steel bodies are covered with hinged iron lids which are subject to unusual wear and tear, and which rattle objectionably. In the immediate future, at least 50 additional garbage wagons will be required for replacements, for the growth of the service with the growth of the city, and for the elimination of the unsatisfactory private-collection system. At least $300,000 is needed for this equipment and for equipment required in street cleaning and ash and rubbish collection.

Live Stock

The city has purchased 1,911 head of live stock, comprising 1,900 horses[1] and 11 mules, at a cost of $284,859. Of this total number, 315 were acquired in the fall of 1920 from two of the largest street-cleaning contractors, and were seasoned horses trained in street-cleaning work. The price per head ranged from $185 to $200. In preparation for city-wide municipal operation in 1922, the city purchased 1,600 additional head of live stock, about half of which were accepted, after examination for soundness and fitness, from the street-cleaning contractors at prices ranging from $99 to $169. The remainder were untrained horses purchased by contract at prices ranging from $137.50 to $169, but

[1]By June 15, 1923, the number of horses had been reduced, through natural losses or by transfer of useless animals, to 1,727, of which 1,378 were working, 181 were fit but idle, and 168 were sick or being rested at the model farm.

with few over $144. The selection of these horses had to be done with great care. Skill was necessary, too, in handling the untrained horses until they became accustomed to work on city streets.

With the purchase of the 1,600 additional head of live stock in 1921, the municipal government became the largest single owner and user of horses in the city. In this gasoline age, when horses have been replaced to so large an extent by motors, the purchase of so many horses by the city may doubtless appear inadvisable. However, for street work where frequent stopping and starting is necessary, the horse-drawn vehicle is superior in many ways to the gasoline-motor vehicle, and possibly in some ways to the electric-motor vehicle. The horse, moreover, is thoroughly reliable, and there is less interruption to horse-drawn service than to motor service. In what proportions the city should make use of these two types of equipment, however, is a question requiring detailed study.

Stables

Good stables are essential to maintaining live stock in proper working condition, and it is also important that the animals be housed in a way that will not be objectionable to the neighborhood where stables are located. The municipal government, as the largest single operator of horse-drawn equipment within the city, should set the highest standard of stable construction and operation. Conditions were found to be far from satisfactory in a large number of the stables that were leased, and an effort has been made to correct these conditions to the extent that money was available.

On chart II are shown the locations of the various stables in use, and the street-cleaning districts which they serve. Practically all these properties have been rented for a term not exceeding five years, under leases which are terminable within that period. The leases usually provide for an automatic increase in rent equal to the increase, if any, in the amount of city taxes paid by the owner. Such improvements as may be made by the city accrue to the owner on the termination of the lease. The annual rentals and other terms of the contracts are indicated in table II-3. Agreements of purchase are not included.

TABLE II-3

REAL ESTATE RENTED AND CONDITIONS OF RENTAL

Location	Description	Amount annual rental	Date of possession	Date of ordinance	Term of lease	Other conditions
13th and Shunk Sts.	Stable	$10,000	1/1/22	11/10/21	5 yrs.	Tax increase over 1921 to be reimbursed by city.
1120 Race Street	" and transfer station	15,000	1/1/22	11/10/21	5 "	E. H. Vare Co. retains office on second floor.
2713 Fletcher Street	Stable	1,200	1/1/22	11/10/21	5 "	Tax increase over 1921 to be reimbursed by city.
1204 Montgomery Ave.	Stable	7,200	1/1/22	11/10/21	5 "	"
4th St. and Wyoming Avenue	"	4,000	1/1/22	11/10/21	5 "	"
Haines and Magnolia Streets	"	6,000	1/1/22	11/10/21	5 "	"
25th and Moore Sts.	"	4,500	1/1/21	2/11/21	10 "	
Shur's Lane & Mitchell Street	"	900	1/1/22	6/8/22	5 "	Tax increases over 1921 and water charges to be reimbursed by city.
55th & Summer Sts.	"	6,600	1/1/22	6/8/22	5 "	Tax increases over 1921 and water charges to be reimbursed by city.
1245 W. College Ave.	"	3,600	1/1/21	4/6/21	5 "	Tax increases over 1921 to be reimbursed by city.
3300 South Broad St.	Wagon and motor shop	10,000	1/1/22	11/10/21	5 "	Tax increases over 1921 to be reimbursed by city.
2610 Callowhill Street	Stable & dumping wharf	2,500	1/1/21	1/22/21	5 "	
Montgomery Ave. & Carlisle St.	Stable	300 per mo.	1/1/22	11/28/21	month to month	Lease terminated 6/30/22
30th and Sp. Garden Streets (Callowhill)	Wagon & motor shop	7,750	6/15/21	7/6/21	5 yrs.	Tax increases over 1921 and water charges to be reimbursed by city.
38th & Market Streets	Stable	6,600	9/15/21	11/10/21	5 "	Tax increases over 1921 and water charges to be reimbursed by city.
Frankford & Glenwood Avenues	Stable	6,000	11/1/21	6/8/22	5 "	Tax increases over 1921 to be reimbursed by city.
State Road & Devereaux Street	Stable	1,500	12/15/21	6/8/22	5 "	Tax increases over 1921 and water charges to be reimbursed by city.
Total		$93,350				

Improvements to Leased Property

Up to the close of 1922, about $200,000 was expended from the appropriations to the division of street cleaning for improvements made on the leased properties, and an additional $40,000 was used during the first five months of 1923. City forces paid out of appropriations other than those of the division of street cleaning also performed about $15,000 worth of work, consisting principally of paving in the yards of stables. The largest expenditure on any one property, about $70,000, was made at Thirty-eighth and Market Streets, where a brick stable was erected after the William Penn Hotel, an old landmark, had been torn down. The most modern equipment for the care of work horses was installed in this stable. Extensive improvements were also made in the stables at Fifty-fifth and Summer Streets and at Thirteenth and Shunk Streets, while at Frankford and Glenwood Avenues about $25,000 was used to convert an old garage into a stable. The emphasis throughout has been placed upon adequate light, ventilation, and drainage. To attain the last, concrete runways were constructed which permit the extensive use of water for cleansing. While it was deemed advisable to use plank flooring in the stalls, very tight construction was adopted. Stables of this general construction can be operated without offense to the most fastidious and are practically rat-proof. The manure is removed daily to obviate storage on the premises and to prevent fly-breeding.

Unfortunately, lack of time and funds has made it impossible to provide permanent stables of modern construction for the entire service. This work is perhaps not more than half completed. Such an excellent building as the one at Thirty-eighth and Market Streets is offset by the grossly unsatisfactory stables at 1245 College Avenue and at Haines and Magnolia Streets. Additional funds should be provided to enable the street-cleaning division to hasten the completion of its program of stable construction.

Even more urgent, however, is the question whether the city should lease or own its stables. It may well be questioned whether the city has not gone too far in making improvements on private property which is held under relatively short leases. Is this property to be leased permanently or is it eventually to be ac-

quired by the city? Will not the city pay double for the improvements if the property is finally purchased? Will the use of draft animals increase or decrease in the future? These are pertinent questions which should be answered as soon as possible. This can be done most satisfactorily by referring them, with other questions such as those relating to permanent methods for refuse disposal, to competent consultants employed to make a study and report upon the whole work.

Purchase of Leased Property

We have been advised that the leased properties now used by the city which it can and will want to purchase may be bought for approximately $750,000. This represents an outlay of approximately $500 per horse capacity. The total yearly rental of these properties is $73,100 and their assessed valuation for the year 1922 was about $400,000. Approximately $250,000 has already been expended by the city for improvements. While it appears that the municipal government should have acquired in the beginning those properties which it might advantageously own, or should have leased them subject to purchase at an agreed price, it is not yet too late to conclude these arrangements. Perhaps, however, the city is depending on the right of eminent domain and on its ability to fix fair prices for purchase by the usual methods of condemnation of property.

The Model Farm

At what is known as the "Model Farm" the city possesses rather unique facilities for the care of animals. Some years ago the city acquired the old Cannon Ball property in the extreme southwestern section of the city to be used ultimately as a site for sewage-treatment works. One of the buildings on the farm has been remodeled into a veterinary hospital and equipped with facilities pronounced by authorities to be of the very best. Horses which require conditioning and medical attention are taken to the model farm, where extensive pasturage is available. This farm is also used by the department of public safety for fire and police horses. The farm itself is managed by the bureau of city property, which raises crops and engages in other farming activities. Some of the forage produced is given to the street-cleaning division for use at the district stables.

City Stable at Glenwood Avenue and Diamond Street

The first city-built stable for the street-cleaning division has been completed. It is located upon land which originally belonged to the Glenwood Cemetery plot but was never used for cemetery purposes. The land was secured by the city through condemnation. The stable is an L-shaped, brick building, one story in height, with two feed-storage rooms in a second story over about one-third of the area of each L. There are also two detached brick buildings, one for the blacksmith shop, the other for an office. The construction is of the most modern type, especially designed to be rat-proof and to have adequate drainage. Stalls are of tight timber construction. The buildings accommodate 230 horses, and cost, with equipment, about $125,000, which is approximately $500 per horse. According to report, this is about the same cost per horse capacity that would be incurred if the contractor's stables were purchased.

Strong objection to the stable has been made by the residents of the locality in which it is located. Although no protests were heard when the city council, by an ordinance approved July 7, 1922, authorized the condemnation of the land as a site for a stable, the neighborhood subsequently became much aroused and obtained a preliminary injunction restraining the city from proceeding with the work. After a hearing, however, the court refused to make the injunction permanent. Opponents of the project were instrumental in having a bill introduced and passed in the state legislature in 1923 to limit the building of stables in cities of the first class (of which Philadelphia is the only one). The bill provided that "no stable large enough to accommodate more than 50 horses at one time shall be erected in any city of the first class within 800 feet of any public playground, school, church, or other place of religious worship having a seating capacity for over 100 persons." In the veto message of March 29, the governor states that, in the absence of a substantial reason why the proposed regulation should not be applied as well to second- and third-class cities, the bill would undoubtedly be held unconstitutional; that the standards fixed were arbitrary; that the bill violated the principle of home rule; and that it was intended to hamper municipal street cleaning.

It is uncertain what will be the outcome of this first attempt to build city stables. As soon as Glenwood Avenue is opened

through the cemetery tract, access to the stable will be facilitated, and there will be less concentration of street equipment. The rear of the stable abuts on the New York division of the Pennsylvania Railroad. Hence the most probable source of complaint will be from the houses on Diamond Street, the yards of which overlook the stable yard.

In adding to the number of satisfactory stables which have already been provided, the city may desire to erect modern structures at other points, and it is unfortunate that the city has not adopted a zoning plan to guide the department of public works in selecting locations. Because of the objections which may be raised to other locations, the stables now leased by the city, and already established in the neighborhood, have a special value. Their locations, however, may not always be the most suitable. The whole question of how and where satisfactory stables are to be provided is a complicated one and should receive intensive study.

Conclusions and Recommendations

It is apparent from an examination of the organization chart (chart I), and more particularly from inspections of the work in the field, that the general supervision is inadequate. A volume of work too great for one person to perform fully is thrown upon the deputy chief. The work of the bureau of highways, involving as it does problems requiring technical skill of a high order, should be under the close supervision of engineers trained for this work. This is as true of the activities of the division of street cleaning as of those of other divisions of the bureau. The work of the division of street cleaning might well be consolidated more closely with that of the division of highways and thus brought under the direct supervision of the district highway engineers. An arrangement of this kind would bring to bear upon the work of street cleaning and refuse collection the entire engineering skill of the bureau of highways.

In chart I are shown suggestions for improving the supervising organization. Perhaps this ideal organization cannot be secured at once, but must be attained by gradual improvement. The performance of street cleaning is seldom better than its supervision. At the present time centralized supervision is almost

negligible. Information from several reliable sources supports the view that the success which has been attained has been due very largely to the energy and resourcefulness of the district superintendents. The service would be materially benefited by the close personal contact of the superintendents with the district engineers and by the constructive direction and assistance which the former would receive from the latter. This supervision by the highway engineers should extend, however, only to the street work, namely, the street cleaning and collection of refuse, the disposal services being under separate control. To coordinate the whole work, the district highway engineers should in turn be under the supervision of division highway engineers who would administer the work of a group of districts. Probably not more than two division engineers would be necessary at the present time. By this arrangement the whole organization would be strengthened, adequate supervision provided, the entire street work coordinated, and the responsibility for execution properly placed.

In order that efforts to improve the service and to meet changing conditions may be based on accurate and detailed information, a suitable number of engineers should be employed for compiling data and studying and formulating plans. Only in this way can changes in district boundaries, in schedules, and in the extent to which horse-drawn and motor equipment is used, be correctly made. Of equal importance is the keeping of records, particularly financial records and those designed to assist in the control of equipment. An adequate force should therefore be provided for this work.

It has been pointed out that permanent and satisfactory shops have not yet been obtained. This is a serious handicap to the work of the division. The stables also are in some instances highly unsatisfactory, and, as some of them are rented, money expended for their improvement will not be invested for the permanent benefit of the city unless the city should be able to purchase them at their original value. The problem of providing permanent stables should receive immediate attention, and the question of renting or owning stables should be settled.

As the result of our survey of the organization, plant, and equipment of the street-cleaning work, we recommend that:

1. The organization of street-cleaning work be revised as rapidly as possible to agree with that shown in chart I.

2. Adequate transportation be provided for the supervisory services.

3. A sufficient force of engineers be employed to make the necessary studies and prepare plans to place the operations of the division on the most efficient and economical basis.

4. An adequate number of clerks be provided to permit complete and accurate bookkeeping, accounting, and control record-keeping.

5. Permanent and satisfactory shops be obtained.

6. Permanent stables of the best type be provided, and the question of renting or owning stables be settled.

CHAPTER III

STREET OPERATIONS

Street Cleaning

The actual cleaning of the streets probably appeals more to public imagination than any other service performed by the street-cleaning division. For a long time the unsatisfactory condition of the streets has been a subject of complaint in Philadelphia, and the public expected vast improvement under municipal operation. Most certainly, public decency and convenience require that the streets should be kept reasonably clean, while consideration for the public health demands that at frequent intervals there should be thorough cleansing, especially of much-used streets.

Difficulties of Street Cleaning

It is obviously impracticable to keep all the streets clean at all times. Even if expense could be disregarded, there are many practical difficulties. In the downtown district, for illustration, by using a very large number of blockmen, or "white wings," it would be possible to remove accumulations of dirt so frequently that the streets would have the appearance of great cleanliness. Yet they would be covered with a fine dust that the blockmen could not remove, and this fine dust on a windy day would prove extremely objectionable. It can be removed only by cleaning methods that cannot be used during the working day, when the traffic is heavy. Even though this fine dust is removed during the night, there will be a new accumulation before the following business day is over. Some of this dirt comes from the sidewalks, which the city does not clean, although they are a part of the public highway; and some comes from store sweepings which are placed in the street in violation of city regulation.

Unfortunately, the kind of paving used on many miles of streets cannot be thoroughly cleaned. The streets paved with rough, traffic-worn, granite blocks, originally laid on a dirt foundation without a joint filler, can, of course, be given only a rough cleaning. These streets, however, produce little dust on a windy day, because the dirt is held in the depressions between the blocks. While sheet asphalt paving, laid on a concrete base, can be very

thoroughly cleansed with water, provided the street grades are not too flat, there are many miles of older asphalt pavements, laid on a broken-stone base, and now uneven of surface and frequently in wretched repair, which cannot be thoroughly cleaned. The mileage and area of the different types of street pavement in Philadelphia are shown in table III-1. From this table it is apparent that slightly over 50 per cent of the paving is sheet asphalt, which can be cleaned easily when in good repair, while about 30 per cent is of granite block which is difficult to clean. Of the remaining 20 per cent, 14 per cent is vitrified block.

TABLE III-1

STREET AND ROAD PAVEMENTS (EXCLUSIVE OF PARK DRIVES) IN THE CITY OF PHILADELPHIA, DECEMBER 31, 1922

Kind of pavement	Miles	Square yards
Total	1,793.077	24,243,113
City Streets	1,249.326	19,982,922
Granite block	337.817	6,213,353
Asphalt (sheet)	680.888	10,319,662
" (block)	5.880	55,383
" (block, modern)	1.155	15,238
Vitrified block	175.922	2,836,857
Wood "	21.392	315,997
Cobble	4.448	44,771
Rubble	3.720	54,660
Slag block	7.920	76,610
Cement and granolithic	10.184	50,391
Suburban and Country Roads	371.679	4,260,191
Cement concrete	5.905	69,773
Bituminous	136.474	1,744,484
Waterbound macadam	228.709	2,439,815
Granite block on hillsides	0.591	6,119
Unimproved Earth Roads	172.072	..

Note: The predominant kind of paving in each street is taken in the computation of the mileage. The yardage is based on the actual yardage of each type, including gutters and special types of paving between rails.

Improvements in Methods

During the Blankenburg administration, while street cleaning was still done by contract, studies made of street-cleaning operations in other large cities resulted in certain distinct improvements in the methods used in Philadelphia. The number of blockmen

TABLE III-2

Street Cleaning Under Municipal Operation in 1922 and Comparison of Contract Work in 1920—With Municipal Work in 1922

Street Cleaning Under Municipal Operation in 1922

Districts	Paved area to be cleaned	Machine-broom cleaning			Cleaning by flushing				Hand cleaning by blockmen	
		6 times a week	3 times a week	Twice a week	6 times a week	3 times a week	Twice a week	Once a week	6 times a week	
	Sq. yds.	Sq. yds.	Sq. yds.	Sq. yds.	Sq. yds.	Sq. yds.	Sq. yds.	Sq. yds.	No.	Sq. yds.
Total	25,284,000	3,577,665	6,220,730	4,880,583	3,697,227	3,106,272	2,943,414	1,701,812	424	5,774,156
W. Phila. A	2,591,000	..	749,800	1,197,600	463,960	..	730,389	..	32	451,749
" " B	3,012,000	..	332,600	2,147,500	165,100	680,150	594,775	..	31	453,107
S. Phila. A	3,358,000	1,040,146	..	..	416,618	441,786	..	..	56	383,891
" " B		1,190,060	..	..	456,100	..	..	..	40	264,993
Race	1,599,000	632,459	..	..	831,768	..	..	..	66	408,117
Columbia	3,239,000	715,000	1,452,464	..	545,030	924,206	..	..	69	679,745
Fairhill	2,453,000	..	1,930,021	..	328,695	635,906	..	..	24	342,464
Frankford	3,939,000	..	..	1,334,765	160,000	..	..	1,701,812	8	112,970
Tacony		..	..	200,718	..	..	..	..	5	75,000
Logan	2,055,000	..	484,756	..	283,700	93,200	702,960	..	37	1,006,720
Germantown and Manayunk	3,038,000	..	1,271,089	..	46,256	331,024	915,290	..	56	1,595,400

Comparison of Contract Work in 1920 With Municipal Work in 1922

Year	Equipment used			Average yardage cleaned daily			
	Machine brooms	Sprinklers	Flusher routes	Total sq. yds.	Machine brooms sq. yds.	Flushing sq. yds.	Blockmen sq. yds.
1920	86	42	19	12,848,456	7,356,456[1]	2,700,000[1]	2,792,000
1922	83	45	38	20,504,182	8,214,891	6,515,135	5,774,156

[1] Approximate.

was increased; cleansing by the use of water replaced machine-broom cleaning on many streets; and minimum standards of labor and equipment were set up. But the changes in cleaning methods made since the inauguration of municipal street cleaning, have been far more extensive and beneficial. Many more motor flushers and blockmen have been used. Machine brooms have been relegated to the rougher streets, especially streets where heavy traffic exists, and are used on other streets only once a week, immediately after ash and rubbish collections. Some of the more obvious defects in the old street-cleaning schedules have already been corrected. While a major revision of the street-cleaning work in West Philadelphia was made effective on January 1, 1923, radical revision of the work throughout the city is waiting upon detailed analysis by the engineering force, which is too small to meet the demands upon it.

Quantity of Work Performed

Table III-2 shows a schedule of the street-cleaning work for each district and for the entire city, and indicates the method and frequency of cleaning. This schedule can be compared with the accompanying record of the work performed during 1920, the last year of city-wide contract performance. The area of pavement to be kept clean approximates 25,000,000 square yards, of which the average area cleaned daily during 1922 was 14,700,000 square yards, whereas the daily average in 1920 was only about 10,000,000 square yards. From this area a total of 504,246 cubic yards of street dirt was collected in 1922. In table III-3 is shown the quantity of street dirt collected in each month of 1922. It appears that the smallest monthly collection was made in January and the largest in October.

Although the number of machine brooms remained practically constant, the use of flushers doubled, and the number of blockmen increased 70 per cent. In some sections, machine-broom cleaning has been practically discontinued except for one cleaning a week, following the ash and rubbish collections. However, in some sections of the city, notably South Philadelphia, it has been found advisable to increase machine-broom cleaning, which has kept the total amount of this kind of work in 1922 about equal to that in 1920.

TABLE III-3

QUANTITY OF STREET DIRT COLLECTED IN 1922, BY MONTHS

Months	Quantities collected in cubic yards
January	24,216
February	31,372
March	40,964
April	43,285
May	44,566
June	46,146
July	40,987
August	46,419
September	43,860
October	51,225
November	50,774
December	40,432
Total	504,246

Relative Value of Various Methods

To analyze the methods of street cleaning now employed in different sections of the city, or to attempt to indicate what methods are best under the conditions encountered, is beyond the scope of this report. It should be understood that there is no one method of street cleaning that is effective under all conditions of pavement surface, street traffic, and weather. The most effective and economical apparatus and methods must be determined by study and experience, and the apparatus and methods must be changed from time to time as conditions require. Perhaps the motor flusher has at present the greatest all-round usefulness; but it cannot be used on many of the older pavements, especially those composed of blocks laid on a dirt base. However, on a smooth, impervious pavement surface which has a proper crown and grade, the use of sufficient quantities of water under pressure, as from a motor flusher, is very effective in removing not only the coarser dirt, but also the finer dust. This is especially true if the street is flushed twice, or if it is sprinkled prior to flushing. Water may also be applied by hose flushing, although this method is used less now than formerly. Vacuum sweepers have given a certain amount of satisfaction in some cities, but they are of no

value when the pavements are wet, and other conditions also reduce their value in Philadelphia. The horse-drawn broom is used more or less in practically all cities. It removes only the coarser dirt, and on a smooth pavement usually smears the dirt in a thin film over the entire surface. On rough pavements, where a high degree of cleanliness cannot be obtained, the use of horse-drawn brooms is doubtless economical. The motor sweeper, which sprinkles and sweeps with one operation, and which is usually provided with a pick-up belt and a dirt-storage box, should not be viewed as a new method of cleaning, but only as a step in the substitution of motors in place of horses and men. The motor sweeper is also made with a special broom for cleaning the gutter. Like some other forms of street-cleaning equipment, it operates best on well-paved streets with an even curb and gutter; its use on roughly paved streets is destructive of the mechanism. The motor sweeper doubtless has some field of usefulness in Philadelphia, although the street-cleaning division has not been very well satisfied with the two machines that have been operated for short periods.

Of great importance in the list of facilities are the blockmen, or "white wings." It is impossible to build a machine that has the intelligence of a workman. The hand-broom sweeper can do well certain kinds of cleaning that a machine cannot do at all. The so-called alleys must be cleaned by hand labor, and on streets with numerous depressions or irregular gutters, hand brooming alone is effective. If he cleans only the gutters and the scattered accumulations of dirt on the crown of the street, the blockman is capable of covering a considerable territory in a day's work. Automobile traffic throws the dirt from the street into the gutter, and in many localities all that needs to be done to make a street attractive is to clean the gutters and to pick up the litter. In districts with well-paved streets, cleaning by blockmen is very effective if supplemented by flushing. As a result of a detailed study of methods, the officials of the street-cleaning division are of the opinion that the number of blockmen will be further increased by as much as 75 per cent in a few years. If blockmen are to become so important a part of the organization, their wages should be increased so that better laborers can be obtained. Heretofore, the most inefficient and the physically defective have been used as blockmen.

The appearance of the workmen has not received sufficient attention. In the eyes of the public, blockmen personify the street-cleaning work, so that untidiness may easily be assumed to imply inefficient work. Neat workmen, on the other hand, may inspire in the public a desire to cooperate in the work of keeping the streets clean. It is probable, also, that a man who is neatly uniformed will feel a desire to justify his equipment and appearance and will do better work. For these reasons, it is important that the blockmen be neatly dressed when they are at work, and as the white uniform is typical of cleanliness and has become traditional in this service, it should be continued. In order that the cost of this equipment may not prove burdensome to the workmen, provision should be made for it in the wage.

Collection of Ashes and Rubbish

The collection of ashes and rubbish is an important part of the work of the street-cleaning division. During 1922, as shown in table III-4, 1,795,557 cubic yards of ashes and rubbish were collected. To collect this huge volume of refuse efficiently and economically requires not only careful planning and organization of the work by the street-cleaning division, but also the cooperation of the householder.

TABLE III-4

Quantity of Ashes and Rubbish Collected in 1922, by Months

Months	Quantities collected in cubic yards
January	213,228
February	258,461
March	198,626
April	175,285
May	145,551
June	87,485
July	77,808
August	70,012
September	68,870
October	80,374
November	166,452
December	253,405
Total	1,795,557

Separation of Household Wastes

For collection purposes, household wastes are required to be separated into three kinds: garbage, ashes, and rubbish. This classification is a result of experience with various methods of waste disposal. For a number of years, over half the city's garbage has been treated by the reduction process, whereby certain constituents which have a commercial value are extracted, while the remainder has been used largely for pig feeding. Accordingly, it has been necessary to collect the garbage as free as possible from other household waste, and it is required that there shall be a separate, non-leakable, covered receptacle for garbage in each household. To some extent, other kinds of waste, particularly tin cans, are mixed with the garbage, and of course some garbage is thrown with the rubbish and ashes; but the extent of this practice is not known.

Since 1909, an ordinance of council has prohibited the mixing of rubbish with ashes. This regulation was made to permit the contractor to salvage salable material from the rubbish, thereby making possible a lower price to the city for the collection service. To insure the separation of ashes and rubbish more effectually, about ten years ago the collection of ashes and rubbish on different days was instituted. This practice permitted the use of wagons specially designed for each kind of waste. Since the collection on different days of the week was inconvenient to householders, however, and resulted in littering the streets on two different days of the week, the collection of ashes and rubbish in recent years has been made on the same day of the week. Also, since little use has been made of the opportunity to salvage the rubbish, both ashes and rubbish are now usually collected in the same wagon, the capacity of which is increased by the use of sideboards when the larger part of the load consists of rubbish, which is bulkier than ashes in comparison with its weight. When ashes and rubbish are mixed in the wagons and disposed of together, their separation by the householder is not so important. On the other hand, the introduction of incineration, which ordinarily is used for rubbish disposal only, will make it necessary for the householder to comply rather faithfully with the ordinance requiring separation.

Method of Collection

Ashes and rubbish are collected once a week throughout the year in the entire city. The householder is required by city regulation to place the containers at the curb. While this is generally done, it is extremely difficult to prevent the collectors from carrying the refuse from the house, if paid by the householder. The street-cleaning division is quite aware of the existence of the practice of accepting tips. Recently, however, when the wages paid by the city have not been so high as those paid in private employment, it has perhaps not been expedient to make any effort to prevent this practice. The system of tipping is by no means a weakness peculiar to municipal operation, but existed also under contract operation. Undoubtedly, many householders would be glad to pay the increased cost of collection if the collectors would carry the household wastes from the yard or from the house. Some sentiment in favor of this method has been expressed in city council. The refuse could be carried out by the city's collectors more easily from detached or semi-detached houses, or from row houses which have a door to the cellar from the street; but since the majority of houses are built in rows without such means of access to the street from the cellar, it would be necessary for the collectors to go through the house, and would thus place upon the city a heavy responsibility for safeguarding private property.

There are 21 ash and rubbish routes in the 12 street-cleaning districts, some districts having as many as three routes. A collection route, in general, comprises the territory served in one day by the district ash- and rubbish-collection equipment consisting chiefly of horse-drawn wagons and the necessary complement of helpers or loaders. Trucks are also used, particularly in the Columbia and Fairhill districts, where the hauls are unusually long.

In the course of studies of methods of ash and rubbish collection in the several districts, it has been found, as in West Philadelphia, that, on certain routes, trucks can be used more satisfactorily than wagons. When adequate refuse-disposal facilities become available at more centrally located points, wagons doubtless will be greatly preferred. At present, however, additional trucks should be provided, particularly for replacements.

Changes in Schedules

At the outset of city-wide municipal collection, the city used the collection routes developed under the contract system. This was necessary to prevent confusion on the part of the collecting forces, which had been largely employed under the contractors, and also on the part of the public, which had become accustomed to collections at certain fixed times. It was realized, however, that while these collection routes had apparently been laid out with some attention to density of population and length of the haul to the dumps, they had not been planned for the building up of new sections or for the changes in the location of dumps. Arbitrary limitations, moreover, had been imposed upon these routes by district lines which divided the work of different contractors. Experience in ash and rubbish collection during the winter of 1922 disclosed the fact that the contractors had not properly proportioned the work to the equipment and labor employed and that there were great inequalities in the amount of work assigned to the different days of the week.

Some readjustments have been made in the layout of the collection work to overcome the more obvious defects. Owing to the lack of comprehensive and reliable information about the work done under the contract system, it has been necessary to study each section of the city in detail. Adequate revision must depend upon the more comprehensive records now maintained and upon special studies made in the field. Radical changes can be made no faster than these studies can be conducted.

The methods which are used for disposing of ashes and rubbish are described in Chapter IV, but it may be mentioned at this time that the refuse is hauled in the wagons or trucks in which it is collected directly to the dumps or barges.

Experiments are being conducted with waterproof brown canvas covers, especially made to stand the hard service, and the results have been satisfactory except in freezing weather. These covers can be drawn down tightly to prevent spilling even when wagons are overloaded. Since overloading is the general practice, the canvas cover is more desirable than the iron cover which stands partly open, revealing the load.

Garbage Collection

From July 1 to October 1, garbage is collected each week-day in the section of the city south of Hunting Park Avenue and between the Delaware and Schuylkill Rivers; elsewhere it is collected at least three times a week, and an attempt is made to collect four times a week. During the rest of the year, collections are made three times a week in all districts, except in Tacony and Manayunk, where they are made twice a week.

Manner of Collection

Garbage, like ashes and rubbish, is collected according to fixed routes which determine the work for each week-day. Ordinarily, the garbage route covers the work of one wagon only, and the driver makes the collection himself, although sometimes he is assisted by a helper. To some extent, the city has experimented with the use of trucks in collecting garbage. The truck is able to make quicker delivery to the point of disposal; but in a house-to-house collection it must be started and stopped many times for each loading, the motor must be kept running during short stops, and, on account of the many stops and starts, the average speed is much less than the most economical speed of the truck. Even where a gang of loaders is used to speed up the collection, it is doubtful whether a saving of cost can be effected. Trailers to be drawn by horses during collection of the load, and by motors when the load is transferred to the point of disposal, might be adaptable in some sections.

Private Collectors

Private garbage collectors still operate to some extent in Philadelphia, but there has been a 50 per cent reduction in their number since the war period. Prior to 1921, the city contracted for all garbage collection and disposal in one annual contract. No attempt was made to control the private collector, except that by ordinance he was supposed to obtain a license from the city's board of health. The contractor for garbage collection and disposal welcomed the private collector in outlying districts from which the haul to the reduction plant would have been expensive, and was also grateful to the private collector for removing the garbage produced in summer in excess of the capacity of the reduction plant.

At the close of the war, the drop in the price of pork reduced the number of private collectors who desired garbage for pig feeding. Also, restrictions of the health authorities have considerably reduced the number of locations in Pennsylvania where piggeries can be operated, although considerable garbage is taken to piggeries in New Jersey, where the restrictions are not so severe. Since the private collector is ordinarily irresponsible, and cannot be depended upon for regular collections, the decrease in the number of private collectors is a distinct improvement.

In 1921, when the city took over the operation of the garbage-reduction plant, but contracted for garbage collection except in the central part of the city, private collectors were permitted to operate only as agents for the collecting contractor, who was held responsible for their work. Under this restriction, it became the custom for the contractor to put men on the streets to help load the private collectors' wagons, and some of the private collectors were also paid by the contractor, usually in the form of a wage to the driver.

This latter arrangement was continued in substantially the same form by the city in 1922 when it assumed direct control of the entire garbage collection. In spite of the rather close supervision thus exercised over private collectors, it is estimated that a large percentage of the complaints of poor service are due to the derelictions of private collectors. It is desirable, therefore, that the city service should completely replace private collection in all sections, eventually even in collections from hotels, restaurants, and hospitals. This step would probably have been taken by the city before were it not that more garbage is produced than can be disposed of in the reduction plant. The operators of piggeries would doubtless be willing to carry away the garbage collected by city forces, a method which is already being used at a transfer station in Germantown.

Equipment in Use

In table III-5 is shown the number of garbage wagons operated by the city in each district in 1922, the number of paid private collectors, and the number of licensed private collectors. Of paid private collectors, there were only 11 at the close of the year 1922, and these were operating in the northern extremity of the city. There were 74 licensed private collectors, 25 of whom

TABLE III-5

EQUIPMENT USED BY CITY AND PRIVATE COLLECTORS IN GARBAGE COLLECTION IN 1922

Districts	Number of wagons operated by the city								No. of wagons of paid private collectors	No. of wagons of licensed private collectors
	Total		Average used in winter		Average used in summer		Spare wagons			
	L	S	L	S	L	S	L	S		
W. Phila. A & B	53	1	38	..	50	..	3	1	..	25
S. Phila. A & B	44	..	28	..	42	..	2	..	..	23
Race-Columbia	58	..	33	..	54	..	4	..	..	20
Fairhill	31	..	15	..	31	4	..	..	..	2
Frankford	20	..	11	2	18	..	2	..	..	..
Tacony	..	5	..	..	..	..	..	1	..	2
Logan	22	1	10	..	16	1	6	1	6	..
Germantown	28	1	18	1	23	5	5	..	3	2
Manayunk	..	7	..	3	..	..	..	2	2	..
Total in district	256	15	153[1]	6	234[2]	10	22	5	11	74
In shop	3	3	..	..	..	..	..	..	..	...
Condemned	2	21	..	..	..	..	..	..	..	..
			..	..	..	..	..	..	..	..
	261	39	..	..	..	..	..	..	..	..

L = Large wagons of 1¾-ton capacity.

S = Small wagons of 1-ton capacity.

[1]Varied between 148 and 163 large and small wagons.

[2]Varied between 188 and 244 large and small wagons.

operated in West Philadelphia, 23 in South Philadelphia, 22 in the northern-central section of the city, and 4 in the outlying northern districts. The greater number of these collectors operate from New Jersey.

Garbage-Collection Complaints

The records of the street-cleaning division indicate that 4,272 garbage-collection complaints were received in 1922, an average of one to each 100 houses. The average number of complaints received daily during the entire year was 14; from June to October the daily average was 22, and for the rest of the year it was 10. About 40 per cent of these complaints were not well founded. Many of them, for example, were complaints about the lack of daily collection during May and June, which are not months during which daily collections are made. The complaints received were turned over promptly to inspectors in the districts from which they came and were investigated to learn whether the collection service had failed. Some complaints, such as those made of failure of collection when the garbage was not accessible, are unreasonable; but they serve to keep the operating personnel keyed to the highest pitch. On the other hand, an accumulation of complaints when the work is being handled with great difficulty, as in time of a labor shortage, is discouraging in the extreme. During the late spring and early summer of 1923, it was practically impossible, because of the low wages paid and the disagreeableness of the work, to obtain a sufficient number of garbage-wagon drivers; consequently many complaints were received.

Frequency of Collection

While garbage is collected each week-day during the summer in some of the more closely built-up sections, it is not collected daily in all sections. This is a basis of complaint from persons who move from the central section of the city, where they have been accustomed to daily collections, to sections, such as West Philadelphia, where garbage is collected every other day. There really is no sound reason for making collections less frequently in one of these sections than in the other. But since the extension of the daily collection service will add to the cost, it may be impossible to accomplish this immediately, although there is doubt-

TABLE III-6

NUMBER OF TONS OF GARBAGE COLLECTED IN 1922 AND METHODS OF ITS DISPOSAL

Months	Total collected	Method of disposal						
		By city forces and paid private collectors						By licensed collectors
		Total	Conveyed to garbage-reduction plant			Conveyed to piggeries by paid private collectors	Dumped on farms	
			Total	Directly	By barges			
Total	216,754	184,466	116,170	36,622	79,548	20,563	47,733	32,288
January	10,832	8,922	6,183	1,944	4,239	1,439	1,300	1,910
February	10,884	8,821	6,130	1,743	4,387	1,391	1,300	2,063
March	13,087	10,610	7,527	2,265	5,262	1,700	1,383	2,477
April	13,739	11,338	7,683	2,452	5,231	1,800	1,855	2,401
May	17,252	14,479	9,403	3,080	6,323	1,800	3,276	2,773
June	19,581	16,747	10,921	3,427	7,494	1,900	3,926	2,834
July	24,988	21,981	12,767	4,159	8,608	1,970	7,244	3,007
August	29,262	26,103	14,512	4,096	10,416	1,993	9,598	3,159
September	25,357	22,195	12,721	3,942	8,779	1,847	7,627	3,162
October	20,281	17,366	11,137	3,899	7,238	1,646	4,583	2,915
November	16,229	13,237	8,654	2,868	5,786	1,685	2,898	2,992
December	15,262	12,667	8,532	2,747	5,785	1,392	2,743	2,595

Total population, 1,900,000.

Average daily production of garbage per person during year, 0.62 lb.

" " " " " " " " August, 1.00 lb.

Average weight of garbage per cu. yd., 1,027 lbs.

Average load of paid collectors weighed 3,420 lbs.

" " " private " " 2,480 lbs.

less a strong popular sentiment in its favor. As a matter of fact, it is not necessary to collect garbage every day to prevent it from becoming a source of nuisance or inconvenience. Collections three times a week would conform to the most stringent rules of sanitation if every householder would provide a garbage receptacle of adequate capacity and of the proper kind.

Amount Collected

The amount of garbage collected in 1922 by city and private forces was 133,923 loads, or 216,754 tons, exclusive of garbage from hotels, restaurants, and hospitals. The distribution of this amount over the 12 months of the year is indicated in table III-6. Of the total, 163,903 tons were collected by city forces, 20,563 tons by paid private collectors, and 32,288 tons, or about one-seventh of the total, by licensed private collectors.

Conclusions and Recommendations

We have found that, in general, the work of cleaning the streets has been well done under municipal operation. The work is extensive and presents many difficulties. These difficulties are due in part to conditions, such as narrow alleys, and street surfaces of types not easily cleaned, which cannot be changed immediately, if at all. Other difficulties, arising from such conditions as poorly-constructed pavements and improper uses of streets in some localities, can and should be corrected as soon as possible.

The municipal forces have been able, during the comparatively short period of their operation, to render satisfactory service is removing ashes, rubbish, and street dirt. However, this work has been done under serious handicaps which must be eliminated as far as practicable before the work can be conducted on the most efficient and economical basis. In the plans for future development of the collection service, the problem of ultimate disposal of ashes and rubbish must be given serious consideration.

One of the principal difficulties in the collection of garbage arises from the lack of team alleys. Since this condition cannot be changed where it exists, the collection methods must be adapted to it. From necessity, the work was conducted at first in accordance with schedules arranged by the private contractors who

previously did the work. These schedules, being poorly planned in many instances, must be readjusted.

We have found that the garbage-collection service has been well maintained and extended, but that, because of difficulties encountered and lack of funds to overcome them quickly, much needs to be done to place the service on a high plane of efficiency. The failure to provide for ease and rapidity of refuse collection when city blocks are planned and houses built adds to the difficulties of the work of collection.

At present the private collector is an important factor in the problem, and should be eliminated for the good of the service. It has been necessary for the division of street cleaning to prosecute the work with an insufficient number of wagons and under disadvantageous labor conditions. These are matters of vital importance which should be corrected by the provision of adequate funds.

Careful studies are necessary to determine the best methods of operation, the most effective equipment and the proper adjustment of personnel for the street-cleaning and refuse-collection services. These studies must be correlated with studies of the whole problem, of which street cleaning and refuse collection are only a part. It is not to be expected that the operating forces can undertake the exhaustive investigations needed for broad, general planning. Competent specialists should, therefore, be employed to make this study.

When the general study has been completed and a plan developed, much work will be necessary to put it into operation and to make the adjustments which changing conditions will require. To do this work, an adequate force of engineers should be permanently employed by the division of street cleaning.

With the need of improvements for the betterment of the service in view, we recommend that:

1. An adequate engineering force be maintained to make the necessary studies and prepare plans to place the street operations on the most efficient basis.

2. The workmen, particularly the blockmen, be neatly uniformed while at work.

3. An adequate number of wagons be obtained for the collection service, and the conditions of labor employment be

adjusted to provide a sufficient number of employes at all times.

4. The street operations be included in a study of the whole problem by competent consulting specialists in order that all parts of the service may be correlated.

CHAPTER IV

DISPOSAL OF REFUSE

The volume of refuse collected annually from the streets and dwellings of Philadelphia is immense. During the year 1922, the municipal forces removed from the streets 504,246 cubic yards of street dirt and collected 1,795,557 cubic yards of ashes and rubbish and 184,466 cubic yards of garbage, in addition to which 32,288 cubic yards of garbage were collected by private collectors. After this vast amount of refuse has been collected, disposal is necessary. The purpose of this chapter is to describe the methods of disposal that are used.

Disposal of Ashes, Rubbish, and Street Dirt

Dumps

At present, ashes, rubbish, and street dirt are disposed of entirely upon land dumps. The greater volume is hauled directly to the dumps in the collection wagons and trucks, although barges are used to transport mixed refuse from dumping wharves on both sides of the Schuylkill River, near the Spring Garden Street Bridge, to dumps in South Philadelphia, and relay trucks have been used to carry material from a transfer station formerly maintained at 1120 Race Street to dumps east of Broad Street in South Philadelphia.

Dumps for the disposal of mixed ashes and rubbish are becoming scarce, and must be sought at constantly increasing distances from built-up sections. Chart II shows the scattered locations of these dumps.

The city always secures the consent of the land-owner for the use of his property by a written agreement terminable by either party on ten days' notice. In the few instances listed in table IV-1, the city pays a small remuneration for the privilege of dumping ashes and rubbish.

It will be observed that the prices paid are relatively small—averaging less than four cents per cubic yard. This is especially apparent when the prices are compared with the charge usually made by owners of dump property to building contractors for the privilege of dumping excavated dirt. Ashes and rubbish, more-

over, constitute a much less desirable fill, because they settle slowly and cannot be built upon for a considerable period. Land-owners are always reluctant to grant the city the privilege of dumping mixed ashes and rubbish, when private building contractors will not only pay more for the privilege of dumping but use better materials for fill.

TABLE IV-1

RECORD OF RENTALS PAID FOR ASH AND RUBBISH DUMPS IN USE IN 1923

Location	Payment	Conditions	Average amount of material dumped
Fishers Lane and Harrowgate Lane, Wheatsheaf Lane and Cedar St.	$3,500 annually	No limit to quantity dumped	142,000 cu. yds. in 1922
Manayunk Ave. and Leverington Ave.	750 "	"	19,000 cu. yds. in 1922
Ridge Ave. and Harvey St.	750 "	"	19,000 cu. yds. in 1922
Walnut Lane and Ampho St.	1,800 to fill (completed Dec. 31, 1923)		63,000 cu. yds.
Thirty-second St. and Midvale Ave.	5,000 to fill (completed June 1, 1923)		80,000 cu. yds. (capacity)

Clean ashes alone are most excellent filling material: the combination of fine dust with larger particles settles quickly into a mass that has good sustaining power. Mixing rubbish with ashes, however, destroys almost completely the good qualities of the ashes as material for fill. The mass of mixed refuse contains large voids and does not settle readily; it therefore harbors rats which feed on garbage mixed by the householder with the rubbish in violation of city ordinance. Fires occur with great frequency in the combustible material. This, to some extent, constitutes a fire menace, and always creates a smoke nuisance in the immediate neighborhood. Dumps used for mixed ashes and rubbish, moreover, are extremely unsightly and offensive.

Harrowgate Incinerator

The time is not far distant when public opinion will demand the discontinuance of the practice of dumping mixed ashes and rubbish. Because of the great difficulty already experienced by

the division of street cleaning in securing convenient sites for mixed-refuse dumping, a start has been made toward the installation of incinerating plants, capable of burning the greater bulk of rubbish easily and cheaply, and operating under such high temperatures that garbage can undoubtedly be consumed also without creating offense. The Harrowgate incinerator will serve the northeastern section of the city. It will have a capacity of 280 tons of mixed refuse each 24 hours. The furnaces are of the Sterling type, similar to those in use in Toronto, Canada. The plant, which will cost slightly over $400,000, will be available for use in 1924; its location on a hillside will greatly facilitate the operation. Since this initial incinerating unit is in a sense an experiment, the results of its operation may determine whether the city will construct other plants.

It will be recalled that the department of public works was authorized by an ordinance approved August 4, 1921, to proceed with the construction of the first incinerating unit at Eighteenth and Cambria Streets. Plans had been drawn and bids received, when opposition to this project resulted in council's withdrawing its authorization on October 21, 1921, and upsetting the department's plans to complete the first unit in time to relieve the acute need for garbage-disposal facilities anticipated in the summer of 1923. The department expects such satisfaction with the operation of the Harrowgate plant that further appropriations will be made for constructing three additional plants, one in the Germantown-Chestnut Hill section, one in West Philadelphia, and one in South Philadelphia. It is estimated that at least $1,500,000 will be necessary to complete this program. So urgent and so vital to the convenience and health of the people does this program appear, that the necessary funds should be provided at the earliest possible moment.

Aspects of the Incinerating Project

No provision is being made at the Harrowgate plant for the reclamation of valuable material from the rubbish, nor for the utilization of the heat which is generated in the combustion process. The financial gain from picking over the rubbish before it is burned is so uncertain, and depends so directly upon market conditions for salvaged materials, that it is questionable whether

the city is justified in making the additional investment in the facilities that would be needed, or whether the city should add this troublesome activity to its present problems. Utilization of the generated heat would also require additional investment, which might be justifiable under some conditions, and not under others. Problems of this kind should, of course, be decided on the advice of competent specialists.

Disposal of Garbage

Methods have to be found for disposing of the vast quantity of garbage collected annually in Philadelphia. As pointed out in Chapter III, 216,754 tons were collected during 1922. Although 32,288 tons of garbage were collected and disposed of by licensed private collectors, there still remained 184,466 tons which had to be disposed of by the city.

Because of the city's inadequate disposal facilities, it was necessary, as an emergency measure, to place 47,733 tons on farms in West Philadelphia, South Philadelphia, Richmond, and Tacony. The farmers were glad to receive the garbage because it constitutes a cheap and good fertilizer. Garbage, however, is not suitable for use as fertilizer until it has decayed for about two years. This method of disposal may, therefore, prove objectionable to neighbors unless the odor is neutralized and fly-breeding prevented. If land disposal is to be used to any considerable extent pending the provision of other means of disposal, the garbage should be buried under a layer of earth. To do this, to be sure, would entail some expense, but would doubtless prove cheaper than some of the other substitute methods of disposal.

Garbage Reduction

The garbage-reduction plant, which was erected in 1906, is located on the west bank of the Schuylkill River at the foot of Forty-ninth Street. This plant was acquired by the city in January, 1921, from the Penn Reduction Company, which for some years had held an annual contract for the collection and disposal of garbage from the entire city. The purchase price was $500,000, which included, however, 300 garbage wagons and a repair shop. According to the bureau of highways, the wagons and shop may be valued at $40,000. Of the remaining $460,000, the land is

worth $60,000, the buildings $100,000, and the machinery and equipment $300,000.

A process known as the modified Arnold system is used at the plant. The garbage is cooked by steam under pressure, and is then pressed to separate the water and grease which are conducted to skimming tanks. The solid residue, after drying, is treated with naphtha for the extraction of additional grease, and is then dried and screened. This finely divided residue, known as tankage, which is used as a fertilizer or as a fertilizer base, and the grease, obtained in the two operations mentioned, are salable by-products, the market price of which largely determines the extent of the net cost, or the net profit, from the operation of the reduction process. During the period of the World War, garbage grease brought as high as 14 cents a pound, and tankage over $15 a ton. Following the armistice, these prices took a sudden drop, and during 1921, the first year of the city's operation of the plant, all tankage produced could not be sold, and grease prices were so low that it was not profitable to operate the percolators for the extraction of all the grease.

Grease prices increased considerably in the first few months of 1923. Under a three months' contract for the sale of grease, beginning May 1, 1923, the city received 7.05 cents a pound. Conditions were favorable for the operation of the reduction plant during 1923, and the results reported for the year show a profit. These conditions, however, should not be accepted as more than temporary, nor should it be assumed that extensive additions to this plant, or the construction of other garbage-reduction plants to dispose of all the garbage produced in the city, is preferable to some other method of disposing of the surplus that cannot be treated in the present reduction plant. If allowances for depreciation and interest on the investment are included, the cost of operating the reduction plant during 1922 appears greater than the return from the sale of by-products. Other years of loss will doubtless be as frequent as years of profit.

The objective should be a method of rapid and sanitary disposal which creates no nuisance. In general, the plant at the Schuylkill River and Forty-ninth Street has not been so objectionable in its operation as some of the garbage-reduction plants in other cities. The gases which arise from the drying of the tankage are about the only source of objection. A taller chimney,

equipped with a spray for washing the gases, has been completed, so that the washed gases are discharged at a higher elevation. If necessary, some provision will be made to treat the offensive fumes that are not absorbed in the washing. Since the entire plant, however, becomes saturated with odors from the cooking and drying processes, its location close to residential districts is undesirable. If additional garbage-reduction plants would have to be placed at remote points, it might be preferable, from a financial standpoint, to adopt some other method of disposal, the necessary plants for which could be more centrally located. Although such a system might cost more per ton for treatment, it should result in a net saving because of cheaper collection and transportation costs.

Results of Operation of Garbage-Reduction Plant

Quite satisfactory results have been obtained by the garbage-reduction plant under city operation. Fortunately the city was able to retain as superintendent, a man formerly employed at the plant under private auspices, who enjoys a high standing among garbage-reduction-plant operators. The plant has been kept in continuous operation with not more than the ordinary amount of maintenance costs. Certain expensive replacements, however, must necessarily be made in the next few years. Oil is soon to replace coal as fuel under the boilers, with a resulting increase in horsepower, a simplification of the operation, and a decrease in cost. The record of operation of the plant has entirely allayed fears that the municipality could not operate such a plant as successfully as a private owner. Success hinges primarily upon efficient supervision and freedom from external interference; and so long as the city is willing to pay for efficient supervision, and the operating personnel is appointed and retained on the basis of merit, the operation of the plant should be a success.

Obviously, since the managers of the plant cannot control the market prices of its products, the success of the garbage-reduction plant should not be judged only by the net profit or net cost. Nor should the plant be expected to handle all the garbage collected, or to work at an overload for an extended period. The nominal capacity is 520 tons for a day of twelve hours. Because of the necessity for making repairs and cleaning the equipment, the plant cannot be operated at full capacity over an extended

period. In August, 1922, on 27 weekdays, 13,832 tons of garbage were handled, an average of 512 tons per day. During the week of August 14-19, 6,756 tons were brought to the plant, an amount exceeding 1,000 tons per day, while on one day, Monday, August 14, 1,411 tons were received. The plant is not operated at such a load in August because of any financial gain from the manufactured by-products, but only because it is imperative that disposal be made of the garbage. Garbage collected in August and September, when the fruit and vegetable season is at its height, is, of course, unusually high in moisture content and exceedingly low in grease content. The greatest percentage of grease in garbage occurs in the spring months. Detailed information of the operation of the plant and production of grease and tankage is contained in table IV-2.

Garbage Incineration

The Harrowgate incinerating plant previously described is designed to consume not only rubbish, or rubbish and ashes mixed, but also garbage. Similar plants have proven successful in at least one large city, and it is expected that this plant can be operated even in the summer season with a large proportion of garbage without proving objectionable. On account of the necessity of burning rubbish, doubtless other incinerating plants will be erected, and, if the Harrowgate plant can successfully consume garbage, the present acute garbage-disposal problem will be simplified. Due, however, to the fact that garbage may be used as fertilizer on farms in outlying districts for some years to come, investigation should be made of the possibility and cost of composting garbage, either under natural conditions or in zymothermic cells. The city should be ever on the alert to investigate newly developed processes of garbage treatment that might prove more efficient or profitable.

Water Transportation

For some years the contractors who collected the city's garbage used scows to transport garbage from a wharf on the Schuylkill River near Callowhill Street to the reduction plant. Since the city undertook the collection of garbage, this method of transportation has been continued under private contract. Dur-

TABLE IV-2

RESULTS OF THE OPERATION OF THE GARBAGE-REDUCTION PLANT IN 1922

Expense		
Coal	$118,907.96	
Naptha	12,848.12	
General Supplies and Miscellaneous	26,848.65	
Payroll	116,704.10	
Operating Expense	$275,308.83	$275,308.83
Depreciation on Plant		35,000.00
Interest at 5 per cent on depreciated average plant value of $407,500		20,375.00
TOTAL EXPENSE		$330,683.83
Receipts		
Value of Grease Extracted	$192,256.05	
Value of Tankage Produced	43,587.18	
	$235,843.23	$235,843.23[1]
NET EXPENSE		$ 94,840.60

Unit Costs

Amount of Garbage Treated	105,336 tons
Operating Expense of Garbage Treatment	$2.61 per ton
Total Expense of Garbage Treatment	3.14 " "
Value of By-Products Produced	2.24 " "
Net Expense of Garbage Treatment	.90 " "

DETAILS OF ANNUAL OPERATION

Amount of Garbage Treated	105,336 tons
Amount of Grease Extracted	4,931,320 lbs.
Ratio of Grease to Garbage Treated	2.345 per cent
Amount of Tankage Produced	11,640 tons
Ratio of Tankage Produced to Garbage Treated	11.05 per cent
Coal Used per Ton of Garbage Treated	331.45 lbs.
Naptha Used per ton of Garbage Treated	0.42 gallon

DETAILS OF MONTHLY OPERATION

Month	Tons garbage treated	Tons grease extracted	Per cent grease extracted	Tons tankage produced	Per cent tankage produced
January	6,216	197.0	3.18	490	7.88
February	5,376	186.3	3.47	528	9.82
March	6,856	240.0	3.51	724	10.56
April	7,008	248.6	3.55	900	12.84
May	8,184	269.9	3.30	877	10.71
June	9,496	267.2	2.83	1,180	12.46
July	10,976	203.6	1.86	1,140	10.39
August	13,832	144.4	1.05	1,660	12.00
September	11,104	152.9	1.38	1,104	9.91
October	9,864	225.6	2.29	1,147	11.62
November	8,400	191.9	2.29	930	11.07
December	8,056	138.1	1.72	966	11.92
Total	105,336	2,465		11,640	
Average			2.345		11.05

[1]Represents the value of by-products produced in 1922, not the receipts from sale of by-products. The latter is shown in table VI-1.

ing 1922, 537 barge-loads (or about two-thirds of garbage disposed of at the reduction plant), were transported for an annual contract price of $22,000, or at an average cost of 27 6/10 cents per ton.

Because dumps for the disposal of ashes, rubbish, and street dirt are not available within a reasonable distance of the Columbia district south of Lehigh Avenue, and in West Philadelphia north of Market Street and west to Forty-first Street, water transportation of these wastes by contract was undertaken in 1922. Dumping wharves were used on both sides of the Schuylkill River just south of the Spring Garden Street Bridge. The refuse was conveyed in barges of 1,200 cubic yards' capacity to a point on the west bank of the Schuylkill River north of Penrose Ferry Bridge, where the material was removed by clam-shell buckets, placed on side-dump cars, and deposited on the lowlands back of the bulkhead lines. The contract price was 59 cents per cubic yard, including the entire expense of transporting and disposing of the refuse after it was dumped at the wharf. The limit of the contract for the year was $206,000, and a total of 331,114 cubic yards was transported by this method at a cost of $195,357.26. The contract for the year 1923 was made on a tonnage basis, which is more equitable, and the load is measured by the water-displacement method.

Between June 1 and December 15, 1922, 10,150 cubic yards of unassorted refuse was given to a private company, which picked out 42 per cent for salvage and returned 58 per cent to the scows. The city saved $2,566.50 by the reduction in the material to be transported, but no information is available to indicate whether the operation was profitable to the company.

The city has recently made arrangements for the establishment of an additional refuse-dumping wharf at the foot of Green Street on the Delaware River. To this wharf ashes and rubbish are brought from the Race and Fairhill districts. Since barges are now operating from Green Street Wharf, the transfer of refuse from wagons to relay trucks at 1120 Race Street has been discontinued, except at times when the barge service may be interrupted. The discontinuance of the truck-transfer station has become necessary because of the complaints from persons in the vicinity of 1120 Race Street, and also because of the desirability of reducing the traffic congestion on Broad Street.

City Ownership of Dumps and Water-Transportation Equipment

It is quite probable that water transportation of ashes, rubbish, and street dirt, but particularly of ashes and street dirt, will have an important place in the permanent program for refuse disposal which must be developed in the immediate future. For this reason, consideration should be given to the advisability of the city's acquiring its own facilities for this work. Since the filling-in of the lowlands of South Philadelphia greatly enhances the property values, it may also be to the best interests of the city that tracts suitable for dumping purposes for years to come should be purchased by the city. After these tracts have been improved, they could be devoted to municipal purposes or sold for private development, as may seem best at the time. Only by purchasing ground can the city be certain of adequate dump sites at available points, and if the property is enhanced in value by the city's refuse-disposal operations, the city should reap the benefit of the increased value. The function of city ownership of dumps, as well as of water-transportation equipment, should receive detailed study.

Conclusions and Recommendations

Serious consideration should be given to methods of ultimate disposal of refuse. Since water transportation is closely related to the collection and disposal work now done by the city, the advisability of acquiring its own water-transportation equipment must be determined by the city. The city must decide to what extent dumps shall be used, and whether it shall own or lease the dumps. Other methods of disposal, such as incineration, should be considered in the light of the most recent knowledge and experience.

One of the most pressing matters which confronts the city is the problem of garbage disposal. The solution of this problem, and also the selection of methods to be employed for disposing of other refuse, will require detailed analysis of all the factors which influence refuse disposal in Philadelphia. This is work which those engaged in meeting the urgent needs of the daily service should not be called upon to do. It is, therefore, advisable that competent consulting specialists be employed to study the problem and advise the city.

The methods of refuse disposal which have been used, although admittedly not wholly satisfactory, have probably been the best that could be obtained under existing conditions. However, as there is obviously need for improvement, we recommend, as the result of our study for the bettering of the refuse-disposal service, that:

1. Competent consulting specialists be retained to study the conditions and advise the city as to the best methods of refuse disposal, correlating this study with a study of the collection services.

2. The city determine and adopt the most economical and satisfactory policy for the future development and use of dumps, particularly the owning or leasing of dumps.

3. The city consider the advisability of acquiring its own equipment for the transportation of refuse by water.

CHAPTER V

PERSONNEL PROBLEMS

Introduction

Size of the Street-Cleaning Service

In carrying on its street-cleaning activities, our city government employs a considerable force of workers. In 1922 this force consisted of approximately 3,000 officials and employes, or more than one-seventh of the entire city and county service. The cost of the street-cleaning payroll during that year, in round figures, was $3,500,000, or about one-ninth of the total amount paid out of the city treasury for salaries and wages.

The following is a list of the positions, number of incumbents, and rates of pay in the street-cleaning division, as given in the budget for 1924:

Street Cleaning, Collection and Disposal of Ashes and Rubbish, and Collection of Garbage

Salaried employes

Deputy chief (in charge of street-cleaning division)	1 at	$6,000.00	a	year
Assistant engineer	1 "	3,850.00	"	"
Assistant engineer	1 "	2,750.00	"	"
General superintendent of horses	1 "	300.00	"	mo.
Superintendent	18 at $200 to	250.00	"	"
Assistant engineer	1 at	250.00	"	"
Supervising engineer	4 "	200.00	"	"
Inspector	6 at $140 to	175.00	"	"
Foreman	45 " 150 "	166.66	"	"
Sub-foreman	120 " 100 "	125.00	"	"
Foreman, motor mechanics	3 at	175.00	"	"
Clerk or timekeeper	30 "	125.00	"	"
Stenographer	3 "	110.00	"	"

Per-diem employes

Horseshoer	40 at	$6.00	a	day
Blacksmith	16 at $5.50 to	6.00	"	"
Blacksmith's helper	8 at	4.50	"	"
Wheelwright	32 "	6.00	"	"
Harnessmaker	10 "	6.00	"	"
Motor mechanic	22 at $5.50 to	6.00	"	"

Carpenter	8 at	$5.50	a	day
Painter	4 "	5.50	"	"
Truck driver	150 "	4.00	"	"
Bricklayer	2 "	5.50	"	"
Laborer	550 "	3.75	"	"
Laborer	975 "	3.50	"	"
Laborer	950 "	3.20	"	"
Laborer	500 "	2.75	"	"

MUNICIPAL GARBAGE PLANT

Salaried employes

Superintendent	1 at	$5,000.00	a	year
Assistant superintendent	1 "	250.00	"	mo.
Foreman	1 "	166.66	"	"
Sub-foreman	1 "	125.00	"	"
Steam engineer	3 at $150 and	125.00	"	"
Fireman	7 at	125.00	"	"
Clerk and timekeeper	1 "	125.00	"	"

Per-diem employes

Derrick operator	1 at	$6.00	a	day
Machinist	4 at $5.50 to	6.00	"	"
Ironworker or boilermaker	2 at	6.00	"	"
Bricklayer	4 "	5.50	"	"
Laborer	5 "	.55	an	hour
Laborer	25 "	.50	"	"
Laborer	50 "	.45	"	"
Laborer	20 "	.40	"	"

Importance of Competence and Morale

One of the major problems in rendering efficient street-cleaning service is that of securing and maintaining a high level of competence and morale in this extensive human organization. It is not a problem that ordinarily solves itself, for competence and morale do not develop automatically; they have to be fostered by the employing authorities. Unless workers are selected with care, they are not likely to measure up to reasonable standards of competence; unless working conditions tend to stimulate rather than depress, a high morale cannot be expected.

Purpose and Scope of Chapter

The purpose of this chapter is to examine what is now being done to foster competence and morale in the city's street-cleaning

service and to suggest such changes in the present practice as may appear desirable. Because of the limitations of space, this examination cannot go into minute details, but must be confined to the more important phases of the subject. These would appear to be (1) the relation of the civil service commission to appointments, transfers, reinstatements, promotions, and removals in the street-cleaning service, (2) the adequacy of present rates of compensation of street-cleaning employes, and (3) the hours of work, vacations, holidays, sick leave, and provision for retirement of these employes.

Distribution of Employment Authority

It should be understood at the outset that authority over employment matters is exercised by a number of officials and official agencies. These include the executive officials of the department of public works and the bureau of highways, who have power to make all appointments, transfers, reinstatements, promotions, and removals, subject, however, to the rules of the civil service commission; the civil service commission, which tests the qualifications of applicants, establishes lists of eligibles for appointment, and prescribes rules governing appointments, transfers, reinstatements, promotions, and removals; the city council, which fixes the rates of compensation of employes and regulates their hours of work, holidays, vacations, and sick leave; and the mayor, to whom ordinances passed by council are submitted for approval. In our consideration of the various phases of the street-cleaning employment problem, this distribution of authority should be borne constantly in mind.

Relation of the Civil Service Commission to the Problem

The Commission's Important Place

Of the officials and official agencies, other than the executive officials of the department of public works and the bureau of highways, who have employment authority in the street-cleaning service, the civil service commission occupies the most important place. Under Article XIX of the new charter, the commission exercises control over appointments, transfers, reinstatements, promotions, reductions, suspensions, and removals in the classified service of the city government. The division of street cleaning, being wholly

within the classified service as defined by the city charter, is subject to the commission's control. Authority to classify positions according to duties and to recommend to the mayor and council standard rates of pay for the various classes is also conferred upon the commission.

Classification of the Service

As an aid to employment control, the commission, by direction of the charter, has arranged the positions in the classified service in three classes: the exempt class, which includes positions, other than that of unskilled laborer, for the filling of which competitive examinations have been found impracticable; the labor class, which includes ordinary unskilled laborers; and the competitive class, which includes all positions in the classified service not included in the exempt and labor classes. All positions in the street-cleaning division are in the competitive and labor classes, about 552 being in the former and about 3,075 in the latter.[1]

The Competitive Class

The commission's control of employment affairs is more thorough-going in the competitive class than in any other. Appointments and promotions in this class can be made only from eligible lists established by the commission as the result of competitive examinations. These lists remain in effect for at least one year, if not sooner exhausted, and not more than two years. For each vacancy the commission certifies the names of the two persons having the highest rating on the most appropriate eligible list, the appointing officer being permitted to choose either one. A name that has been twice passed over by an appointing officer may not again be certified to that officer for the same or a similar position. The initial appointment or promotion is for a probationary period of three months. If during that period a new appointee's services are unsatisfactory to the appointing officer, the latter may

[1]These figures relate to positions authorized in the city budget for 1924. The reason for the apparent discrepancy between this statement and the one in the first paragraph of this chapter is that the actual number of employes at work is not as great as the number of positions authorized in the city budget.

notify him that he will not be retained after the end of the three months. If the probationer is not so notified, his appointment or promotion becomes permanent at the expiration of the probationary period. In the absence of an appropriate eligible list, the appointing officer may nominate a person to the commission for non-competitive examination, and if the nominee is certified by the commission as qualified, he may be appointed or promoted provisionally until a regular appointment or promotion can be made. A provisional appointment, however, cannot continue longer than three months.

Only brief mention is possible of the other forms of employment control exercised by the commission in the competitive class. Transfers from one office, bureau, or department to another office, bureau, or department can be made only after approval by the commission. Under the commission's rules, persons laid off on account of lack of work or lack of funds are placed on reinstatement lists from which they are certified for reinstatement in the inverse order of their laying-off. Persons separated from the service on account of delinquency or misconduct, however, may be reinstated only upon requisition of the appointing officer and the approval of the commission, which must be satisfied that "the charges upon which the person was separated have been found not true, or were inadequate, and that the separation was not justified." Furthermore, no requisition for such a reinstatement is honored if received by the commission later than one year after the separation occurred. Outside the uniformed police and fire forces, the commission exercises but slight control over removals from the service. The appointing officer is required to furnish the employe with a written statement of the reasons for the removal (which must be neither religious nor political), and to allow him five days to make a written reply. A copy of the statement of reasons and of the employe's reply must be filed with the commission. In the uniformed police and fire forces, a removal cannot be made unless ordered by the commission, after a public trial before that body, but in other branches of the city service in the competitive class, including the street-cleaning service, the appointing officer himself has final power to remove.

The Labor Class

In the labor class, the commission is less exacting in its requirements than in the competitive class.[2] No competitive examinations are given to labor applicants. The only test such applicants must undergo is for physical fitness. After having successfully passed this test they are placed upon a labor eligible list in the order of their applications. Under normal conditions, physical-fitness examinations for laborers are given only four times a year, but if the lists are exhausted, the commission may hold examinations at more frequent intervals. When examinations are held quarterly, the lists remain in effect for three months. At the end of the three-month period, any eligible may "re-register" without examination and thus continue his eligibility for appointment for another three months. No name, however, may remain on the list "which on the first day of January, April, July, or October has been carried thereon for six months."

Somewhat greater latitude of choice is permitted the appointing officer in making appointments in the labor class than in the competitive class. Under the rule now in effect, the 10 names standing highest on the list are certified for a single vacancy, and, if more than one vacancy is to be filled at one time, five names are certified for each additional vacancy; but no single certification may contain more than 100 names. Unlike the rule for the competitive class, however, the rule governing appointments in the labor class does not limit the number of times a name may be certified to the same appointing officer for the same or a similar position. In emergencies, when it is not practicable to secure laborers from the commission's lists with sufficient promptness, or when the lists are temporarily exhausted, the appointing officer may employ any available persons as laborers, subject to the subsequent approval of the commission.[3] Laborers so employed,

[2] In May, 1924, after this report was in the printer's hands, the civil service commission amended its rules governing the labor class. Under the amended rules, which went into effect on May 29, 1924, labor applicants always are examined for physical fitness at the time of application, the provision for quarterly physical fitness tests being omitted; re-registration at the end of a three-month period is no longer necessary; and the restriction on the number of names that may be certified for appointment has been removed, so that now the entire list is available to the appointing officer. These changes give the operating officials greater latitude than they had under the old rules.

[3] The privilege of emergency appointments has been used thus far to only a very slight degree.

however, cannot be retained in the service more than 30 days, and must give way to regular appointees as soon as the commission is able to furnish laborers from its lists.

Substantially the same rules govern transfers, reinstatements, and removals in the labor class as in the competitive class. Unskilled laborers, however, may not be transferred or promoted to positions in the competitive class.

No Changes Proposed for Competitive Class

It is now in order to consider whether it is desirable to make any changes in the employment procedure just described, and, if so, to outline briefly what those changes ought to be. Should the commission continue the same control that it now maintains over employment in the street-cleaning service? Should this control be relaxed somewhat, or should it be increased? Only incidental consideration can be given to the technique employed by the commission in exercising its control.

There appears to be no need for a change in the competitive class. That part of the street-cleaning organization which falls within this class is not essentially different from other branches of the city service in the same class. The rules of the commission governing the competitive class, moreover, are substantially the same as those in effect in other large cities, and are the result of long and varied experience.[4]

Conflicting Viewpoints on Labor Class

In the employment of unskilled laborers, however, the relations between the commission and the street-cleaning service present a more difficult problem. There are those who feel that the operating officials, who are confronted with the necessity of maintaining at full strength an enormous corps of unskilled workers, should have the greatest possible freedom of action: some would go so far as to remove all control by the commission over the employment of street-cleaning laborers; others would simply lessen somewhat the restrictions now imposed by civil-service rules. On the other hand, there is the fear that any relaxing of control by the commission would open the way for political favoritism and a

[4]The civil service commission is to be commended for the efficient manner in which it assisted the street-cleaning division in building up the supervisory organization of the street-cleaning service in 1922.

lowering of the standards of fitness. Which of these attitudes should be given the greater weight cannot be determined offhand.

Argument of the Operating Officials

The argument most strongly urged in behalf of the operating officials is that gaps in the labor ranks could be filled more expeditiously without the intervention of the commission. Under the commission's rules, it is pointed out, many procedural steps are necessary to add a new worker to the force. First a requisition must be sent to the commission; then the commission must certify to the department the required number of names of labor eligibles; then notices must be sent to these eligibles to report to the proper departmental official; thereupon several days may elapse before the men to whom the notices were sent actually present themselves, and when they do appear they may decline appointment on account of the remoteness of the place of work from their homes or for other reasons. Most of this delay, so the advocates of greater freedom for the operating officials feel, might be avoided if these officials were given a free hand to employ any suitable persons who might offer their services.

Expedition in Recruiting Not Only Need—Physical Tests

Expedition in recruiting laborers, however, is not the only consideration. At least equally important is some means of protecting the city from the employment of persons who are physically unfit for the work, and who are peculiarly liable to become a financial burden under the workmen's compensation act. The physical examination given by the medical examiner of the civil service commission now serves as such a means. It would be possible, to be sure, for the department of public works to retain a medical examiner of its own, or to require labor applicants to present health certificates from their personal physicians or from physicians designated by the department. None of these arrangements, however, seems to have the merits of the one now in effect. None of them would centralize responsibility for physical examinations in one agency nor make it as easy to enforce uniform requirements for labor applicants in all departments as does the present plan. So long, moreover, as labor applicants are examined at all, there is bound to be some delay in recruitment, no matter by whom the examinations are given.

Exemption from Civil-Service Control Dubious

It might be suggested that, while the commission ought to continue to examine laborers for physical fitness, it ought not to exercise any other control over labor appointments. This, too, however, is a dubious proposal. Little time would be gained by permitting the departments themselves to maintain lists of qualified labor applicants, for the only procedural steps this would eliminate are the requisition for laborers by the department and the certification of eligibles by the commission, neither of which makes for much delay. Nor does the limitation of the number of names that may be certified for a single vacancy seem unduly restrictive. Whereas the appointing officer is permitted to reject nine out of ten names for a single vacancy, and may pass over four out of every five additional names if more than one vacancy is to be filled, it appears that in actual practice more than 50 per cent of the laborers whose names have been certified for street-cleaning work have been appointed.[5] The commission, moreover, has stricken from the list the names of all labor eligibles who have failed to respond to notices to report for work, thus averting unnecessary delay in securing workers from future certifications. During times of labor shortage, when a waiting list of eligible laborers could not be maintained, it has been the practice of the commission to examine laborers physically either immediately after the filing of their applications or within one day thereafter, and then, if they passed the test, to send them immediately to the offices of the division of street cleaning for assignment to the various street-cleaning districts. In emergencies, such as a heavy snowfall, the street-cleaning officials may avail themselves of the emergency clause in the civil-service rules which permits of the employment of any available laborers for a period not exceeding 30 days. Compliance

[5]According to the records of the civil service commission of the 359 eligibles certified during January, February, and March, 1922, from the list of "laborer (driver)," 261, or 72.7 per cent of the total number, were appointed. During this same period, 468, or 70.3 per cent of the 666 street-cleaning laborers certified, were appointed. These were months of labor surplus. One year later there was a labor shortage, but the ratio of appointments to certifications still remained high. Of the 269 eligibles certified from the "laborer (driver)" list published January 1, 1923, 180, or 66.9 per cent, were appointed. From a list of street-cleaning laborers published at the same time, 282 eligibles were certified, and of this number 158, or 56 per cent, were appointed.

with the commission's requirements relating to transfers and removals entails little more than keeping the commission currently informed of the actions taken by the departmental officials. Since most removals from the street-cleaning labor service are on account of failure to report for work, it is no great task to specify the reasons for removal as the civil-service law requires. The rule governing reinstatements does nothing more than give preference in appointment to laborers formerly in the city's service but laid off on account of lack of work. Since laborers are seldom, if ever, laid off in large numbers in the street-cleaning service, this rule has little effect upon the freedom of action of the appointing powers. On the whole, even if we assume that no positive advantages accrue from civil-service control, it is difficult to see how its removal would greatly improve the lot of the operating officials.

Positive Advantages of Civil-Service Control

On the other hand, much is to be said for the retention by the commission of the control it now exercises. The importance of examining labor applicants for physical fitness, and the advantage of having this work done under the auspices of the commission rather than under that of the various separate departments, have already been indicated. By making itself the central office for the receipt of labor applications and the custody of labor eligible lists, the commission is able to direct the stream of applicants to points of greatest need and to make available to all departments reserves of workers that might otherwise be pocketed in numerous departmental lists. Certification of laborers in the order of application not only tends to eliminate favoritism in appointment, but serves to instil labor applicants with confidence that, once on the list, they need only wait their turn for a notice to report for work. That this assurance of a square deal induces many laborers to apply for city work who otherwise would not do so may hardly be doubted. Finally, so long as the commission remains the recruiting agency, the operating officials are relieved of the time-consuming annoyance of having to deal directly with a continuous flow of applicants for jobs.

Suggested Changes in the Commission's Practices

There are ways, however, in which the commission's present requirements and procedure could be improved. Each applicant for city employment is required at present to obtain on his formal application the signatures of two citizens vouching for his character. Such vouchers do not appear necessary on labor applications, and probably serve only to indicate the political affiliation of the applicant. If they were omitted, the applicant would be saved considerable time and trouble, and, in a period of labor shortage, the street-cleaning division would be supplied more promptly with new workers.

The procedure in examining labor applicants for physical fitness, too, could be changed for the better. At present, all laborers seeking employment in departments under civil service must report to the office of the commission's medical examiner for examination. This does well enough in times of labor surplus. When there is a labor shortage, however, laborers are less inclined to make the trip to city hall to undergo the physical-fitness test, and the district superintendents are more likely to find gaps in the ranks when the street-cleaning workers assemble at the various stables in the morning. At such times it would be a great convenience to the district superintendents if they could hire on the spot any able-bodied men who might present themselves, and not be obliged first to send them to city hall for physical examination. Why not have a medical examiner from the commission go to the stables and examine the men there? This need not be done every morning, but only on those mornings when the districts are short of men and applicants are at the stables ready to take the places of those who failed to report for work. A telephone call from the district superintendent early in the morning would serve to summon the medical examiner to the place of need. Laborers applying at the offices of the commission, moreover, ought always, during a period of labor shortage, to find it possible to be examined physically immediately after the filing of their applications. The occasional day's delay to which they are now subjected ought to be avoided. By these slight changes in the practices of the commission, the recruiting of laborers could be facilitated without weakening in any respect the safeguards against the employment of incompetent persons, and without sacrificing any of the advantages of centralized employment control.

Adequacy of Compensation

The second phase of the street-cleaning employment problem that has an important bearing upon the competence and morale of the workers is that of compensation. In dealing with this phase of the subject, attention will be focused entirely on the question of the adequacy of present rates of pay in the street-cleaning division.

Tests of Adequacy

No hard and fast conclusions can be reached as to what constitutes an adequate wage for any given class of workers, but certain tests of the reasonableness of existing rates of pay may be applied. These tests are as follows:

1. Comparing the city's rates of pay with current rates in private establishments in Philadelphia.

2. Comparing Philadelphia's present rates with those paid in street-cleaning services of other cities, and

3. Comparing the city's rates of pay with the cost of maintaining a given standard of living at present prices.

Unfortunately these tests cannot be applied to the entire street-cleaning payroll. Many positions in the street-cleaning service are now so peculiar to municipal employment that corresponding positions cannot be found in private business establishments. Again, because of lack of uniformity in organization and in titles of positions in municipal street-cleaning services, a comparison of the salaries of supervisory and clerical employes in different cities is hardly possible. Finally, the standards of living that have been worked out in such a way that their current cost can be readily ascertained are all applicable exclusively to manual workers and are not suitable as a basis for determining the adequacy of the salaries of professional and administrative officials. As a result, the tests enumerated above can be applied only to certain large groups of skilled, semi-skilled, and unskilled laborers. These, however, make up the great bulk of the street-cleaning force.

City's Pay Compared with Private Pay

When compared with current wages in private establishments in Philadelphia, the city's rates appear a trifle low. In the following table the hourly rates of 11 different classes of manual workers in the division of street-cleaning are compared with the average hourly rates of similar workers in a number of large private corporations of this city. Seven of these classes of workers, it will be observed, receive higher wages in private establishments than under the city government. Especially noteworthy is the fact that the average hourly rate of unskilled laborers is four cents higher in private employ than in the division of street cleaning, for most of the street-cleaning workers are included in the classification of unskilled laborers. The city, moreover, pays only the regular rate for overtime work, whereas many of the private employers allow time and half-time and even double time for such work.

TABLE V-1

COMPARISON OF RATES OF PAY IN PRIVATE ESTABLISHMENTS IN PHILADELPHIA WITH THE CITY'S RATES IN 1923

Classes of workers	Number of private concerns reporting	Average hourly rate in private concerns	Hourly rate paid by city
Blacksmiths	13	$0.76	$0.69 [1]
Blacksmiths' helpers	11	.52	.56
Bricklayers	5	.75	.63 [2]
Carpenters	13	.71	.63 [2]
Harnessmakers	3	.62	.75
Horseshoers	2	.69	.75
Motor mechanics	8	.73	.69 [1]
Painters	12	.70	.63 [2]
Truck drivers	10	.53	.50
Wheelwrights	1	.69	.75
Unskilled laborers	12	.45	.39 [3]

[1] Increased to 72 cents in budget for 1924.
[2] Increased to 69 cents in budget for 1924.
[3] Increased to 41 cents in budget for 1924.

City's Pay Compared with Rates Paid in Other Cities

From a comparison of the rates of pay in the street-cleaning services of our larger cities it would appear that Philadelphia is the least liberal among them. The cities besides Philadelphia included in this comparison are New York, Chicago, St. Louis, Milwaukee, and Newark. For every one of the 11 classes of

workers whose rates were compared, the average rate of pay of the other cities is higher than the rate in Philadelphia. In fact, in 1923, all but three of these classes were more poorly paid in Philadelphia than in any one of the other cities. The table showing this comparison follows:

TABLE V-2

COMPARISON OF PHILADELPHIA'S RATES OF PAY WITH THOSE OF OTHER CITIES IN 1923

Classes of workers	Philadelphia	Other Cities					
		Average	New York	Chicago	St. Louis	Milwaukee	Newark
Blacksmiths....	$0.69[1]	$0.91	$1.00	$1.10	$0.90	$0.72	$0.83
Blacksmiths' helpers	.56	.70	.75	.98	.70	.58	.51
Bricklayers	.63[2]	1.19	..	..	1.50	1.25	.82
Carpenters	.63[2]	1.11	1.125	1.25	1.25	1.00	.93
Harnessmakers.	.75	.84	1.05	..	..	.74	.72
Horseshoers	.75	.83	..	..	..	..	.83
Motor mechanics	.69[3]	.92	1.125	1.10	..	.67	.79
Painters	.63[2]	1.04	1.125	1.10	1.125	.72	1.125
Truck drivers ..	.50	.71	.68	.84	..	.60	.73
Wheelwrights .	.75	.94	1.125	..	.85	..	.83
Unskilled laborers[4]	.39[3]	.52	.63	.62	.40	.50	.47

[1] Increased to 72 cents in budget for 1924.

[2] Increased to 69 cents in budget for 1924.

[3] Increased to 41 cents in budget for 1924.

[4] The rates given for Philadelphia, Chicago, and Newark are the average of a sliding scale of pay.

City's Pay Compared with the Cost of Living

Finally, a comparison of the city's pay with the cost of living indicates that the city is none too generous as an employer. According to its most recent survey of the cost of living, the Bureau of Municipal Research of Philadelphia has found that, at prices obtaining in March, 1923, the annual cost of maintaining a workingman's family of five persons in health and decency was $1,854.28.[6] From March to September, 1923, the cost of living

[6] See CITIZENS' BUSINESS No. 567, issued April 5, 1923, and entitled "The Cost of a Workingmen's Standard of Living in Philadelphia at March, 1923, Prices." The family of five assumed in this survey is composed of the two parents, a boy of 13, a girl of 10, and a boy of 6. This survey is based upon a more comprehensive study made in 1917-18, the results of which were published in book form by the MacMillan Company in 1919 under the the caption "Workingmen's Standard of Living in Philadelphia."

advanced 2.6 per cent, thus increasing the annual cost of maintaining such a standard of living to approximately $1,900. If we assume a working year of 313 days, it would require a wage of $6.07 a day to equal this annual cost. The overwhelming majority of per-diem street-cleaning workers, however, receive a wage of less than six dollars a day. In fact, 96 per cent of them receive less than five dollars a day, and 91 per cent receive less than four dollars.[7]

High Turnover in the Labor Service

As might be expected under these circumstances, the turnover in the street-cleaning labor service has been high. During 1922, there were 1,730 separations, exclusive of those of 216 laborers who were dropped because they were not citizens of the United States.[8] Since the average unskilled labor force of the street-cleaning division was about 2,850,[9] it would appear that the year's turnover was approximately 60 per cent. In 1923 the turnover was about 58 per cent, still much higher than it should be.

The Need of City-Wide Standardization of Pay

The obvious need for upward revision of the street-cleaning wage scale suggests the larger need of salary and wage adjustment throughout the entire city service. Employes doing the same work ought to receive the same pay, regardless of their departmental location. If, for example, the city pays carpenters in the street-cleaning division from $6.50 to $7.00 for an eight-hour day, then it should pay carpenters in all other branches of the city service from $6.50 to $7.00 for an eight-hour day. To do otherwise would be unfair and would disturb morale. It is in recognition of this principle of fair dealing that the civil service commission is directed by the new charter to classify all city positions

[7]This statement is based on the budget authorization for 1923. It should be noted also that many of the per-diem employes work overtime and thus increase their daily wage beyond the rates fixed in the budget.

[8]On April 13, 1923, the citizenship requirement for laborers was waived by the civil service commission.

[9]Including unskilled laborers in the garbage-reduction plant.

according to duties, and to recommend to the mayor and council standard rates of pay for all the various classes. Unfortunately, this charter mandate has not been fully carried out. In 1920, it is true, the commission prepared a classification of positions according to duties, and recommended standard rates of pay to the mayor and council, but neither the mayor nor council accepted these recommendations, and no further recommendations have since been made. The result is that most of the numerous inequalities in compensation that were found to exist in the service when the commission submitted its classification report have continued to exist to the present time. That these inequalities should be corrected without further delay requires no argument. The commission ought to bring its report of 1920 up to date, modifying where necessary the classification of positions and revising its schedule of standard rates of pay. The mayor and council would then have a comprehensive and uniform plan for adjusting salaries and wages, not only in the street-cleaning division, but in all other branches of the service as well. Such a plan would enable the city to meet its obligations to the underpaid street-cleaning workers without discriminating against employes in other divisions, bureaus, and departments doing the same kind of work.

Tentative Recommendations for Street-Cleaning Workers

Realizing that recommendations as to rates of pay in the street-cleaning division ought to be made only as part of a more comprehensive plan of classification and compensation, the Bureau of Municipal Research does not venture in this report to do more than advance a few tentative suggestions that may prove helpful in a general revision of the city's payroll. For the administrative officials, the professional staff, and the office employes of the street-cleaning organization, no recommendations at all are here attempted. The only classes of workers for which even tentative wage proposals are submitted are those which were included in the various comparisons made earlier in this chapter. Numerically, however, these classes are far more important than those not included, for they comprise more than 93 per cent of all the employes in the street-cleaning division. Below are the Bureau's tentative recommendations:

Classes of workers	1924 rates	Recommended rates	
		Minimum	Maximum
Blacksmiths	$5.50-$6.00	$6.50	$7.00
Blacksmiths' helpers	4.50	5.00	5.50
Bricklayers	5.50	6.50	7.00
Carpenters	5.50	6.50	7.00
Harnessmakers	6.00	5.50	6.00
Horseshoers	6.00	6.00	6.50
Motor mechanics	5.50- 6.00	6.00	6.50
Painters	5.50	6.00	6.50
Truck drivers	4.00	4.50	5.00
Wheelwrights	6.00	6.00	6.50
Unskilled laborers	2.75- 3.75	3.60	4.50

General Working Conditions

Last to be considered are the general working conditions of employes: the hours of work, vacations, holidays, sick leaves, and provision for retirement. These vitally affect morale. It is pertinent, therefore, to inquire briefly whether the working conditions in the street-cleaning division compare favorably or unfavorably with conditions prevailing elsewhere.

Hours of Work

The formal hours for office workers in the street-cleaning division are the same as in other city-hall offices, and appear liberal in comparison with those observed in private business establishments. Employes are expected to be on hand at 9 A. M., and, when their work permits, may leave for the day at 4 P. M. One hour is allowed for lunch. On Saturday the offices close at 12 noon. In private business establishments office workers are usually required to start at 9 A. M. and continue until 5 P. M., with an hour's intermission for lunch. The half-holiday on Saturday, however, is quite common in offices of all kinds.

Laborers, both skilled and unskilled, who are employed by the day, are treated less generously. For them the standard work-day consists of eight hours. On account of a great deal of overtime employment, especially of unskilled laborers, the actual work-day is perhaps closer to nine hours than eight. The city, to be sure, pays per-diem workers for overtime, but only at the regular rates. Before the days of municipal street cleaning, per-diem employes in the bureau of highways, as well as in other bureaus of the department of public works, were granted a Saturday half-holiday with pay; but since January 1, 1921, the half-

holiday with pay has been abolished. At present, the standard work-week for these employes is 48 hours.

It would be difficult to say whether these conditions are more or less favorable than those prevailing in private establishments in Philadelphia. Of 10 large local corporations which responded to inquiries as to their working conditions for unskilled laborers, two reported a standard work-day of ten hours, four of nine hours, and four of eight hours. In six of these ten concerns, the standard work-week was only five and one-half days as compared with the six-day standard work-week for street-cleaning laborers. Five concerns allow time and half-time for overtime, the other five allowing only "straight" time. The reports of working-time for skilled laborers were so nearly like those for unskilled laborers that the latter may be considered typical of both. While no sweeping generalization can be made from these facts, it seems fair to conclude that our city government is by no means at the head of the procession of local employers in shortening the work-day for manual workers.

In the other large cities from which information as to wages and conditions of employment was obtained, street-cleaning workers appear to have more favorable hours than in Philadelphia. New York City has established the 44-hour week for practically all the skilled workers in its street-cleaning department, although its standard work-week for unskilled laborers is still 48 hours. The city pays 50 per cent above the regular rate for overtime. In Chicago, the hours for street-cleaning laborers, both skilled and unskilled, are the same as in New York, but Chicago pays double the regular rate for overtime. Most of the skilled laborers in the bureau of street cleaning in Newark, N. J., work eight hours the first five days of the week and only four hours on Saturday. Unskilled laborers, however, fare no better there than in Philadelphia. In Milwaukee, the hours of work are practically the same as in Philadelphia for both skilled and unskilled street-cleaning laborers.

Only slight changes in the hours of work in the street-cleaning division appear to be necessary. Office workers might well be required to remain regularly at their tasks until 4.30 or 5 P. M. on all working days except Saturdays. This would be more in conformity with the prevailing practice of the community. On the other hand, so far as possible, per-diem employes should be al-

lowed a half-holiday on Saturday, as was done prior to 1921, and as is done now by many private employers in Philadelphia and by other city governments. Overtime work by per-diem employes should be discourged. Like adjustments in compensation, however, these changes would make for greater equity and better morale if introduced in all departments of the city government simultaneously.

Vacations

The city's policy in granting vacations has been neither generous nor niggardly. Salaried workers in the street-cleaning division are allowed one day's vacation, with pay, for each month of service up to a maximum of 12 days. Per-diem employes are allowed one-half day's vacation, with pay, for each month of service up to a maximum of six days. In private business concerns, a vacation of 12 working days, with pay, for salaried workers is quite usual. Most private employers, however, appear to be less liberal than our city government in their vacation allowance to skilled and unskilled laborers. Of the 13 local corporations from which reports on this subject were received, only one grants any vacation whatever to manual workers. This one, however, allows as much as two weeks' vacation to employes who have been in the service for 10 years, a shorter annual leave being permitted to those whose length of service for the company has been less than 10 years. In the street-cleaning services of the large cities with which other comparisons have been made, the practice varies. New York City allows three weeks with pay to both skilled and unskilled laborers; Chicago allows 11 days; Milwaukee allows 15 days to skilled workers who are paid by the month or by the year, but grants no vacation at all to per-diem manual workers; and Newark allows two weeks to nearly all skilled laborers, but none to unskilled laborers.

There does not appear to be any need for changing Philadelphia's present practice.

Holidays

As a branch of the city government, the street-cleaning division is permitted to observe all the legal holidays, but in actual practice a more conservative policy is followed. The offices of the division are completely closed to the public only on Christmas

Day and the Fourth of July. Other legal holidays observed by such part of the office force as can be spared are New Year's Day, Lincoln's Birthday, Washington's Birthday, Good Friday, Memorial Day, Labor Day, Columbus Day, Election Day, Armistice Day, and Thanksgiving Day. Per-diem workers are allowed only three holidays: Christmas Day, the Fourth of July, and Labor Day. Part of the labor force always is on duty, but the men who work on these days are given time off with pay on other days.

A wide variety of practice in observing holidays may be found among employers, both private and public. Office workers in private concerns are usually allowed the more important holidays, such as Christmas Day, New Year's Day, the Fourth of July, Labor Day, and Thanksgiving Day. In banks, all the legal holidays are observed. Skilled and unskilled laborers, however, fare not quite so well. Only two of the 13 local private employers from whom reports were received allow these classes of workers any holidays with pay. One of them grants seven holidays and the other all calendar holidays. Among four cities, New York, Chicago, Milwaukee, and Newark, none except Newark accords holiday privileges to manual workers. In the street-cleaning service of that city, most of the skilled laborers are granted six holidays with pay, but none are given to unskilled laborers.

In view of the general practice of other employers, the city government would hardly appear justified in liberalizing much further the policy in granting holidays now followed in the street-cleaning division. It is suggested, however, that a slight increase in the number of holidays allowed with pay to per-diem workers might be a good investment in morale.

Sick Leave

Sick leave with pay in the street-cleaning division is confined almost entirely to salaried employes. It has been the practice to pay these employes at the full rate during absences on account of sickness not exceeding 30 days. Under a resolution of councils approved July 15, 1913, the director of the department of public works has the power to accord the same treatment to per-diem workers, but this is done only in extraordinary circumstances.

The city's policy in this respect seems to be quite in conformity with general practice. Office workers and other salaried em-

ployes usually receive greater consideration in time of sickness than workers by the day. This is true in private business concerns, and also in other municipal services. Only one of the 13 local corporations from which reports were received allows sick leave with pay to manual workers, and these workers happened to be paid by the week. None of the four large cities previously referred to grants sick leave with pay to the skilled and unskilled laborers in their street-cleaning services.

While the prevailing practice hardly justifies the city in adopting a more generous policy with reference to sick leave than it now follows, the question still arises whether a more generous policy toward per-diem workers might not materially reduce the labor turnover and stimulate morale. The length of sick leave permitted with pay might well be varied according to the length of service of the worker.

Provision for Retirement

By an act of the general assembly approved May 20, 1915, provision is made for pensioning and retiring city and county employes of Philadelphia who are not taken care of by other pension funds. The employes of the division of street cleaning are covered by this act. It provides that persons who have been in the employ of the city or county for 20 years may receive a pension of one-half their average monthly salary of the last five years of their employment, but no pension shall exceed $100 a month. Employes are required to pay 2 per cent of their monthly salary into the pension fund, but no contribution need be more than four dollars a month. These dues are supplemented by appropriations by the city council. The act is mandatory upon salaried employes, but optional with per-diem workers. Thus far, less than a dozen of the per-diem workers have availed themselves of the provisions of the act.

Although this retirement system is far from perfect, it is nevertheless of real advantage to the city and to the employes. It enables the city, without inflicting undue hardship, to remove from the service persons who on account of age or other disability have ceased to be useful or have greatly declined in efficiency. To the employes, it gives assurance that they will not be left wholly without economic support in their declining years. That up to the present so few per-diem workers have shown interest

in the fund is unfortunate, but as time goes on and the street-cleaning labor service becomes more stabilized, more of them doubtless will do so.

It is not possible, in this brief report, to analyze the retirement act applying to Philadelphia and to propose changes that may be desirable. The suggestion is made, however, that per-diem workers be encouraged in every possible way to avail themselves of the benefits of this act.

Conclusion

General Appraisal

Viewed from all angles, the city's handling of the street-cleaning employment problem has been, in the main, in accordance with good practice. By placing the entire labor force, as well as the supervisory and office organization, under civil-service control, the city has assured itself of reasonable standards of fitness in the personnel of the service. The civil service commission has exercised its control with moderation, and has made commendable efforts to facilitate the recruiting of laborers. With a few exceptions, the working conditions in the street-cleaning division are as favorable as may be found in the average private or public service, and are conducive to good morale rather than depressing.

In certain respects, however, there have been shortcomings. Perhaps the most serious of these is the inadequate wage scale now in effect in the street-cleaning division. No doubt, the high turnover in the labor force is largely due to the low wages paid by the city. The hours of work for the skilled and unskilled laborers, especially for the latter, seem unnecessarily long and exacting. This condition, too, may have something to do with the high labor turnover. In the field of recruiting, there still remain a few avoidable obstacles to speedy induction of new workers into the service.

Summary of Recommendations

To overcome these and other shortcomings, the following recommendations are made:

1. That the character vouchers be omitted from labor applications.

2. That, in times of labor shortage, applicants for labor positions be examined for physical fitness immediately after the filing of their applications.

3. That, in the absence of labor eligible lists, applicants who present themselves at street-cleaning stables where men are urgently needed, be examined for physical fitness at those stables instead of being sent to the offices of the civil service commission for examination.

4. That the wage scale of street-cleaning workers be revised upward as part of a more comprehensive program of classification of positions and standardization of pay.

5. That the formal closing time in city-hall offices be changed from 4 P. M. to 4.30 or 5 P. M.

6. That, so far as practicable, per-diem employes be allowed a half-holiday on Saturday.

7. That a slight increase be made in the number of holidays with pay allowed to per-diem workers.

8. That a more generous sick leave policy be adopted toward per-diem workers.

9. That per-diem workers be encouraged to avail themselves of the benefits of the retirement act.

CHAPTER VI

FINANCIAL CONSIDERATIONS

While service, rather than cost, should be the criterion by which the results of the municipal street-cleaning operations should be judged, cost is, nevertheless, an important consideration. At this time, however, the public is looking for satisfactory results from municipal street cleaning, and it is with the cost of adequate and satisfactory service that we are concerned, and not with the lowest cost at which a pretense of doing the work might be made. The cost should be as low as is consistent with securing the desired results, for if money can be saved on street cleaning, just so much more will be available for other municipal services, or just so much smaller will be the taxpayers' burden.

Cost of Municipal Operation

In an endeavor to ascertain the exact cost to the taxpayers, the Bureau of Municipal Research made a study of the expenditures applicable to street cleaning[1] during 1921 and 1922. It was easy to find out the expenditures from appropriations made to the street-cleaning division. Some expenditures for street-cleaning purposes, however, were made out of other appropriations; and the exact amount of these was not easy to ascertain. Although fairly comprehensive records have been maintained in the street-cleaning division, and rather voluminous reports have been prepared from them to guide the administrative officials, these records and reports do not always show the relations between transactions and appropriations. Furthermore, because of incomplete records of the division's plant and equipment, it was difficult to calculate how much depreciation should be included as part of the cost of the street-cleaning work. It was necessary to piece together the various fragments of information secured, to set up a record of assets in summarized form, and to figure depreciation from this summary. While for the present purpose an approximately accurate analysis must suffice, the Bureau has made some suggestions for improving the accounting system, which, if

[1]Throughout this chapter the term "street cleaning" is used to include not only the cleaning of streets, but also the collection and disposal of ashes, rubbish, and garbage. It does not, however, include snow removal.

adopted, should make it much easier to secure accurate information about the cost of street cleaning. These suggestions are embodied in a memorandum submitted to the department of public works on May 15, 1923, a copy of which is included as an appendix to this report.

The results of the Bureau's financial analysis are set forth in table VI-1. This table shows, for each appropriation for street cleaning, the actual expenditures of 1921 and 1922, and also those of 1920 that were in anticipation of municipal work in 1921. In 1920, the expenditures totaled $335,087.73, in 1921 they amounted to $6,927,459.86, and in 1922 they were $5,637,147.97. As each of these totals includes large sums for the acquisition of real estate and equipment, as well as for operating expense, they must be analyzed if they are to be of any real value.

In this table the expenditures have been classified into expense and outlays. As this classification had not been made on the books of the street-cleaning division, or of the bureau of highways, it was necessary to work backward from the records of the division's plant and equipment, in order to ascertain the amount of outlays made from the several appropriations. The expenditures have also been classified to show how much of each item is applicable to each of the two years 1921 and 1922. Thus, all the expenditures of 1920 have been charged against 1921, and $455,675.35 of the 1921 expenditures, having been made primarily in preparation for city-wide municipal operation in 1922, have been charged against the latter year. Adjustments in the expense totals have been made for the value of forage received from the model farm, for materials and supplies on hand at the beginning and at the end of a year, for bills paid in one year for services or supplies consumed in the previous year, and for overhead costs not included in the division's records. Credit has been given for the receipts from sales of manure, hides, discarded equipment, scrap of all kinds, and by-products from the garbage-reduction plant. The value of services supplied to the highway division, or to other bureaus and departments, has been credited to the extent that it was ascertainable. Depreciation of plant and equipment, figured at the rates shown in table VI-2, has been added as part of the expense. The rates of depreciation used are believed to be ample, and are based very largely on the ex-

Appropriation item		Expenditures applicable to 1922		
		Total	Expense	Outlays
B. of H.	A			
"	A	..	..	..
"	A	..	..	..
"		..	..	..
"		..	..	..
"		..	..	..
"		..	..	..
"		..	..	..
P. A.		..	..	..
"		..	..	..
B. of H.		..	..	..
" Loan		..	..	..
B. of H.		..	..	..
" 60a-6		..	..	..
		$455,675.35	$76,085.83	$379,589.52
		$455,675.35	$76,085.83	$379,589.52
B. of H.	A	$3,641,001.26	$3,575,733.39	$65,267.87
"	A	116,704.10	116,704.10	..
"	A	9,203.41	9,203.41	..
"		106,648.22	106,648.22	..
"		232,218.60	157,376.17	74,842.43

TABLE VI-1

SUMMARY OF EXPENDITURES FOR STREET CLEANING DURING THE YEARS 1921 AND 1922

Appropriation item		Purpose	Expenditures made during the year	Expenditures applicable to 1921			Expenditures applicable to 1922		
				Total	Expense	Outlays	Total	Expense	Outlays
	1920 and 1921								
B. of H.	A-20	Personal services	$920,292.31	$920,292.31	$920,292.31	..	..	..	..
"	A-21	" "	..	..	..	..	..	..	..
"	A-24	Veterinarian service	107,435.55	107,435.55	107,435.55	..	..	..	..
"	50	Contract street cleaning	2,783.82	2,783.82	2,783.82	..	..	..	..
"	51	Garbage collection	3,892,009.13	3,892,009.13	3,892,009.13	..	..	..	..
"	52	Rental of ground, etc.	494,871.00	494,871.00	494,871.00	..	..	..	..
"	54	Clean-street campaign	109,997.67	109,997.67	109,997.67	..	..	..	..
"	55	Electric current	2,765.19	2,765.19	2,765.19	..	..	..	..
P. " A.	256	Supplies and materials	7,871.59	7,871.59	7,871.59	..	..	..	..
"	257	" "	192,317.39	192,317.39	192,317.39	..	..	..	..
B. of H.	56	Plant, buildings, etc.	124,661.62	124,661.62	124,661.62	..	..	..	..
" Loan	265	Land, buildings, and equipment	376,866.97 [1]	376,866.97	48,140.72	$328,726.25	..	..	..
B. of H.		Joint items with highway division	500,000.00	500,000.00	..	500,000.00	..	..	..
"	60a-60m	Equipment, etc.	75,000.00 [2]	75,000.00	75,000.00	..	..	..	..
			455,675.35	..	..	..	$455,675.35	$76,085.83	$379,589.52
		Total of 1920 and 1921 expenditures	$7,262,547.59	$6,806,872.24	$5,978,145.99	$828,726.25	$455,675.35	$76,085.83	$379,589.52
	1922								
B. of H.	A-20	Personal services	$3,641,001.26	..	..	..	$3,641,001.26	$3,575,733.39	$65,267.87
"	A-21	" "	..	..	..	..	..	..	..
"	A-24	Veterinarian service	116,704.10	..	..	..	116,704.10	116,704.10	..
"	47	Lease and rental of grounds, etc.	9,203.41	..	..	..	9,203.41	9,203.41	..
"	48	Repair and replacement of equipment	106,648.22	..	..	..	106,648.22	106,648.22	..
"	50	Clean-street campaign	232,218.60	..	..	..	232,218.60	157,376.17	74,842.43
"	51	Electric current	2,277.93	..	..	..	2,277.93	2,277.93	..
P. " A.	55	Pay bill of V. F. & V.	17,977.65	..	..	..	17,977.65	17,977.65	..
"	256	Supplies and materials	1,281.82	..	..	..	1,281.82	1,281.82	..
B. of H.	257	" "	578,618.09	..	..	..	578,618.09	578,618.09	..
"	54	Plant, buildings, etc.	140,052.28	..	..	..	140,052.28	140,052.28	..
"	60a-60m	Equipment, etc.	4,646.00	..	..	..	4,646.00	190.88	4,455.12
		Joint items with highway division	700,611.35	..	..	..	700,611.35	104,645.86	595,965.49
		Deficiency appropriations	71,223.25	..	..	..	71,223.25	71,223.25	..
			14,684.01	$14,684.01	$14,684.01	..	..	..	..
		Total of 1922 expenditures	$5,637,147.97	$14,684.01	$14,684.01	..	$5,622,463.96	$4,881,933.05	$740,530.91
		Total of 1920, 1921, and 1922 expenditures	$12,899,695.56	$6,821,556.25	$5,992,830.00	$828,726.25	$6,078,139.31	$4,958,018.88	$1,120,120.43
		Expense additions (exclusive of depreciation and interest)							
		Supplies from model farm [3]			$10,000.00			$10,000.00	
		Materials and supplies on hand at beginning of year			..			27,178.16	
		Bills paid from succeeding year's appropriation			2,559.81			57,150.15	
		Miscellaneous overhead [4]			25,000.00			25,000.00	
		Total expense additions (exclusive of depreciation and interest)			$37,559.81			$119,328.31	
		Total			$6,030,389.81			$5,077,347.19	
		Expense deductions							
		Materials and supplies on hand at end of year			$27,178.16			$125,452.87	
		Receipts by purchasing agent for garbage by-products [5]			94,165.16			233,859.61	
		Miscellaneous receipts			1,272.71			11,847.74	
		Electric current used by the highway division [2]			..			6,409.62	
		Previous year's bills paid			..			2,550.81	
		Total expense deductions			$122,616.03			$380,120.65	
		Total expense (exclusive of depreciation and interest)			$5,907,773.78			$4,697,217.54	
		Depreciation [6]							
		On equipment purchased in 1920 and 1921 (cost $358,726.25)			$82,443.81			$72,790.81	
		On equipment purchased in 1922 (cost $920,189.37)			..			188,261.53	
		On garbage-reduction plant (cost $460,000)			35,000.00			35,000.00	
		On improvements to rented property (cost $199,931.06)			..			39,986.21	
		Total depreciation			$117,443.81			$336,038.55	
		Total expense (exclusive of interest)			$6,025,217.59			$5,033,256.09	
		Interest							
		Five per cent on the average investment of city funds in plant and equipment			$38,500.22			$82,359.18	
		Five per cent on the average investment of city funds as working capital			7,500.00			25,000.00	
		Total interest			$46,000.22			$107,359.18	
		TOTAL EXPENSE			$6,071,217.81			$5,140,615.27	

[1] $335,087.73 in 1920; $41,779.24 in 1921.
[2] Estimated.
[3] Estimated value of forage less cost of production.
[4] Conservative estimate of value of time devoted (but not charged) to street-cleaning operations by director of public works, chief of highway bureau, paymaster of the department of public works, employes of highway division, employes of the director's office, employes of purchasing agent, and employes of civil service commission, together with an allowance for the rental value of offices.
[5] Represents receipts from sales of garbage by-products, not the value of by-products produced. The latter for 1922 is shown in table IV-2.
[6] See table VI-2 for computation of depreciation.

TABLE VI-2

SUMMARY OF PLANT AND EQUIPMENT AND COMPUTATION OF DEPRECIATION

Classification and rate of depreciation on cost		1921	1922				
			1921 acquisitions		1922 acquisitions		Total
Motor vehicles							
New	Cost	$132,712.50	B. v.	$99,534.38	Cost	$373,477.18	
25%	Dep.[1]	33,178.12	Dep.	33,178.13	Dep.	93,369.29	
	B. v.[2]	99,534.38	B. v.	66,356.25	B. v.	280,107.89	35,000.00
	B. v.	425,000.00	B. v.	390,000.00		..	390,000.00
Land and building (At 25th Street and Sedgley Avenue)							
	Cost	10,000.00	B. v.	10,000.00		..	10,000.00
Improvements to rented property							
		..		..	Cost	199,931.06	199,931.06
20%		..		..	Dep.	39,986.21	39,986.21
		..		..	B. v.	159,944.85	159,944.85
TOTAL							
	Cost	828,726.25	B. v.	695,082.44	Cost	1,120,120.43	1,815,202.87
	Dep.[5]	117,443.81	Dep.[5]	107,790.81	Dep.[5]	228,247.74	336,038.55
	B. v.	711,282.44	B. v.	587,291.63	B. v.	891,872.69	1,479,164.32

[1] Depreciation.
[2] Book value; that is, cost less depreciation.
[3] Book value reduced by $16,200 exchange value of used equipment in purchase of new equipment included at full cost in 1922.
[4] Depreciation reduced by $3,205 gained on exchange of used equipment for new equipment in 1922.
[5] Including losses of livestock.

TABLE VI-2

SUMMARY OF PLANT AND EQUIPMENT AND COMPUTATION OF DEPRECIATION

Classification and rate of depreciation on cost		1921	1922				
			1921 acquisitions		1922 acquisitions		Total
Motor vehicles							
New	Cost	$132,712.50	B. v.	$99,534.38	Cost	$373,477.18	
25%	Dep.[1]	33,178.12	Dep.	33,178.13	Dep.	93,369.29	
	B. v.[2]	99,534.38	B. v.	66,356.25	B. v.	280,107.89	
Used	Cost	43,945.00	B. v.	8,977.50[3]	Cost	750.00	
50%	Dep.	18,767.50[4]	Dep.	8,977.50	Dep.	375.00	
	B. v.	25,177.50	B. v.	0.00	B. v.	375.00	
Both	Cost	176,657.50	B. v.	108,511.88[3]	Cost	374,227.18	$482,739.06
	Dep.	51,945.62[4]	Dep.	42,155.63	Dep.	93,744.29	135,899.92
	B. v.	124,711.88	B. v.	66,356.25	B. v.	280,482.89	346,839.14
Horse-drawn vehicles							
New	Cost	49,072.50	B. v.	42,938.44	Cost	178,240.00	
12½%	Dep.	6,134.06	Dep.	6,134.06	Dep.	22,280.00	
	B. v.	42,938.44	B. v.	36,804.38	B. v.	155,960.00	
Used	Cost	48,430.00	B. v.	38,744.00	Cost	52,057.00	
20%	Dep.	9,686.00	Dep.	9,686.00	Dep.	10,411.40	
	B. v.	38,744.00	B. v.	29,058.00	B. v.	41,645.60	
Both	Cost	97,502.50	B. v.	81,682.44	Cost	230,297.00	311,979.44
	Dep.	15,820.06	Dep.	15,820.06	Dep.	32,691.40	48,511.46
	B. v.	81,682.44	B. v.	65,862.38	B. v.	197,605.60	263,467.98
Livestock							
15%	Cost	59,790.00	B. v.	49,682.50	Cost	225,084.00	274,766.50
	Losses (cost)	1,340.00	Losses (b. v.)	1,793.50	Losses (cost)	14,750.00	16,543.50
		58,450.00		47,889.00		210,334.00	258,223.00
	Dep.	8,767.50	Dep.	8,451.00	Dep.	31,550.10	40,001.10
	B. v.	49,682.50	B. v.	39,438.00	B. v.	178,783.90	218,221.90
Horse equipment							
	Cost	19,917.50	B. v.	15,934.00	Cost	60,557.78	76,491.78
20%	Dep.	3,983.50	Dep.	3,983.50	Dep.	12,111.56	16,095.06
	B. v.	15,934.00	B. v.	11,950.50	B. v.	48,446.22	60,396.72
Snow equipment							
	Cost	4,050.00	B. v.	3,543.75	Cost	16,473.00	20,016.75
12½%	Dep.	506.25	Dep.	506.25	Dep.	2,059.13	2,565.38
	B. v.	3,543.75	B. v.	3,037.50	B. v.	14,413.87	17,451.37
Shop equipment							
		..		..	Cost	10,508.56	10,508.56
10%		..		..	Dep.	1,050.86	1,050.86
		..		..	B. v.	9,457.70	9,457.70
Office equipment							
10%	Cost	808.75	B. v.	727.87	Cost	3,041.85	3,769.72
	Dep.	80.88	Dep.	80.87	Dep.	304.19	385.06
	B. v.	727.87	B. v.	647.00	B. v.	2,737.66	3,384.66
Garbage-reduction plant							
	Cost	460,000.00	B. v.	425,000.00		..	425,000.00
	Dep.	35,000.00	Dep.	35,000.00		..	35,000.00
	B. v.	425,000.00	B. v.	390,000.00		..	390,000.00
Land and building (At 25th Street and Sedgley Avenue)							
	Cost	10,000.00	B. v.	10,000.00		..	10,000.00
Improvements to rented property							
		..		..	Cost	199,931.06	199,931.06
20%		..		..	Dep.	39,986.21	39,986.21
		..		..	B. v.	159,944.85	159,944.85
TOTAL							
	Cost	828,726.25	B. v.	695,082.44	Cost	1,120,120.43	1,815,202.87
	Dep.[5]	117,443.81	Dep.[5]	107,790.81	Dep.[5]	228,247.74	336,038.55
	B. v.	711,282.44	B. v.	587,291.63	B. v.	891,872.69	1,479,164.32

[1] Depreciation.
[2] Book value; that is, cost less depreciation.
[3] Book value reduced by $16,200 exchange value of used equipment in purchase of new equipment included at full cost in 1922.
[4] Depreciation reduced by $3,205 gained on exchange of used equipment for new equipment in 1922.
[5] Including losses of livestock.

perience of 1921 and 1922 in the operation of street-cleaning plant and equipment. Finally, 5 per cent a year has been charged on the average value of the plant and equipment employed during the year, and also on an assumed amount of working capital.

This analysis shows that the total expense of street cleaning in 1921, under combined contract and municipal work, was $6,071,217.81; and in 1922, under city-wide municipal work, $5,140,615.27. This figure for 1922 exceeds by $213,500 the $4,927,130.65 which the street-cleaning division has reported as the cost for 1922.

Comparison of Municipal and Contract Costs

The inquiring citizen will want to know at once how the costs under city-wide municipal operation compare with those under contract work. As bids were not requested for contract work in 1922, the cost of municipal operation in 1922 must be compared with the cost of contract work of previous years. The cost in 1922 was nearly a million dollars less than that of 1921, when both contract and municipal work were in operation. Had contract bids for 1921 been accepted for all 13 districts, instead of for only 11, the cost in 1921 undoubtedly would have been still greater. However, since lower contract bids probably would have been submitted for 1922, it should not be assumed that the difference in cost between contract work and municipal work in 1922 would necessarily have been as great as the difference in cost between 1922 and 1921. It must be remembered that although the bids for 1921 contract work were submitted on September 15, 1920, when price levels had begun to fall rapidly, conditions in general were uncertain, and the contractors knew that in all probability the year 1921 presented the last opportunity for profit in street cleaning.

Contract bids for the year 1920, though made in the fall of 1919, when costs were increasing, were submitted under more normal conditions. In 1920, under city-wide contract operation, the cost of street cleaning was $5,160,874.22.[2] This amount,

[2]This amount was arrived at with considerable difficulty; but it is believed to be approximately correct. On October 22, 1920, the separate bureau of street cleaning was discontinued and its activities assumed by the bureau of highways. At the same time, some of the unused balances of appropriations for street cleaning were consolidated with appropriations for highway work, and information is not available for determining the exact expenditures for street cleaning from these appropriations.

which represents the entire cost of street cleaning in 1920, including overhead as well as the payments made to contractors, is $20,000 greater than the cost of full municipal operation in 1922.

The cost for the years 1920 and 1922 cannot properly be compared without making full allowance for the differences in both the quantity and the quality of the work performed. The results of street-cleaning operations are intangible, and it is impossible now to inspect and compare the efficiency of operation of 1920 and 1922. It is even difficult to attempt to compare the quantity of work performed. Generally speaking, the contractors collected and disposed of all ashes, rubbish, street dirt, and garbage, as did the city forces; but the quantity collected by the city in 1922 was slightly greater than that collected by the contractors in 1920. Furthermore, as has been pointed out in Chapter III, the city forces in 1922 cleaned a greater average daily yardage of streets than was required under the contract specifications of 1920. To accomplish this greater task, the city employed a larger number of laborers and also increased other collection facilities.

Information supplied by the street-cleaning division indicates that in 1922 the facilities were approximately 20 per cent greater than in 1920. If we may assume that the cost of street cleaning would vary in direct proportion to the facilities employed, and if, for the moment, we disregard the difference in the price levels of 1920 and 1922, it would appear that, had contractors been engaged to do the work in 1922, and had they been required to provide facilities equivalent to those employed by the city, their bids would have been 20 per cent higher than in 1920, and the cost to the city would have been about $6,193,000. If this amount is reduced 15 per cent to allow for the drop in wages and prices that occurred from 1920 to 1922, the cost of doing the work in 1922 by contract probably would have been about $5,264,000, or $123,500 more than the actual cost of municipal work in that year.

Of greater importance, however, than the mere saving in money is the fact that municipal work in 1922 gave greater satisfaction than was ever obtained from contract work, and that a commendable start was made in providing a satisfactory plant, particularly for refuse disposal. Under the contract method it

would have been practically impossible to build up such a plant. A noteworthy advantage, pointed out by many observers of political conditions in Philadelphia, is the marked lessening of contractor influence in municipal affairs.

Financial Control

The control exercised over expenditures is, in the main, satisfactory; but some improvement is possible. The entire system is constantly being extended and bettered in the light of experience.

Payrolls

Since about 70 per cent of the annual expenditures of the division are made through payrolls, their proper control is very important. Wages for labor constitute a very high percentage of payroll expenditures; and since this labor is employed in 12 different street-cleaning districts, under the supervision of over 100 different foremen and sub-foremen, and in 6 plants and shops, under their respective foremen, it is obvious that numerous opportunities for irregular practices exist, and that a watchful eye is needed. The foremen and sub-foremen are relied upon for the daily time records of the men under their supervision. These records are checked and compiled by timekeepers in the respective districts, plants, and shops. The men are paid, however, by the paymaster's office of the department of public works, an organization separate and distinct from the street-cleaning division. Payrolls thus receive an independent check, and, on the whole, the payroll procedure appears to work satisfactorily.

Purchases

Purchases of equipment, materials, and supplies for the division are required by law to be made by the purchasing agent, but in practice many purchases, particularly for equipment, have been made directly by the division. When it wishes to purchase something out of an appropriation made to the purchasing agent, the division draws a requisition upon that official, who then proceeds to make the purchase, if it is within both the purpose and the amount of an available appropriation. When, however, it is desired to purchase something out of an appropriation made to the division, it makes the purchase directly, or through the bureau of highways.

Records of all purchases are kept in the street-cleaning division, and while these records were not complete for 1922, the procedure has since been improved. Invoices are sent to the districts and other offices for certification of the quantities of goods received, and are carefully checked as to prices.

Stores

At all times a considerable quantity of stores is kept on hand, most of them being at the storehouse. According to the 1922 financial report of the division, more than $125,000 of stores were carried over into 1923. This sum was obtained from records of the cost of stores received and issued, and not from a physical inventory. Stores are considered as consumed when issued to the districts or other stations, and inventories of issued but unconsumed stores are not taken. Transfers of materials and supplies are made occasionally between units without suitable record.

Records of Equipment

From the very beginning of municipal operation, a complete record has been kept of the livestock—horses and mules—belonging to the division. Two card records are made for each animal, one being kept in the office of the superintendent of livestock, while the other is kept at the stable to which the animal is assigned. Whenever an animal is transferred from one stable to another, the card relating to that animal is transferred also. The records of other equipment, however, are not so complete, although a similar card system for it was proposed. Each item of equipment is numbered and has its number plate attached, but as no definite record of assignments is kept, and as number plates have been transferred from discarded equipment to new wagons manufactured at the shop, without making proper records of the transfer, a physical inventory, such as has been proposed by the division, will be necessary.

Operating Costs

Through a system of daily reports, concerning the personnel and equipment at work, which are received from each branch of the organization, and through work reports received from foremen, sub-foremen, and other sources, it has been possible to compile rather elaborate records of operating costs. The system

of reporting is being modified and extended to furnish more adequate information to the engineering staff, which is planning more scientific operation. If the changes suggested by us in the memorandum of May 15, 1923, are made in the financial records of the division, it will be much easier to ascertain correct costs.

Conclusions and Recommendations

It is difficult, because of the indefinite factors involved, to compare the costs of street cleaning under contract work with the costs under municipal operation. The analysis presented in the foregoing pages, however, indicates that the municipal operations in 1922 were conducted at a cost materially less than the probable cost of the work if done under contract, and at a cost less than that under contract operation in 1920.

Although the saving in cost is important, of even greater importance are the high degree of satisfaction obtained under municipal operation and the noteworthy start made toward providing suitable plant and equipment, particularly for refuse disposal. The city has also lessened materially the contractor influence in municipal affairs. There can be no doubt, therefore, that the change to municipal operation has been financially beneficial to the city, and has proved advantageous in other respects as well.

The system of accounting and cost keeping should be improved, both to provide accurate records and to furnish detailed cost information essential for developing the greatest economy consistent with satisfactory results. We recommend that the system of accounting and cost keeping outlined in the memorandum submitted to the director of public works on May 15, 1923, be put into operation at the earliest possble moment by the division of street cleaning.

CHAPTER VII

COOPERATION OF THE PUBLIC

By its readiness to complain of unsatisfactory results, the public evidences a keen interest in the efficiency of the work of the division of street cleaning. This interest should prompt the citizen to assist the municipal forces in every possible way, especially by careful observance of the restrictions placed upon him to promote the efficiency of the work. Unfortunately it has been found difficult, both in Philadelphia and other American cities, to inspire this feeling of cooperation. Those who have supported the program of municipal operation against the contract method have hoped that such a feeling might be inspired. Previously many persons made the excuse that efforts to keep the streets clean or to use proper refuse receptacles only benefited the contractor, who was "paid well enough to do the work in spite of the conditions encountered." This excuse is no longer tenable, and the possibility of reducing costs and improving the service should be an incentive to cooperation.

The most important benefit achieved by the introduction of city-wide municipal operation, however, is the elimination of the dual control formerly exercised by the contractors' and the city's supervisory organizations.

Now that responsibility for results is no longer divided, the division of street cleaning naturally is more interested than formerly in enlisting the cooperation of the citizen, in spreading the gospel of good municipal housekeeping, and in enforcing the laws without fear or favor when persuasion fails.

Educational Campaign of 1922

An appreciation of the need of informing the public of its duty not to litter the streets and to use proper refuse receptacles, inspired an intensive campaign, which was begun on July 1, 1922, conducted by inspectors of the division, with the assistance of special police officers and of other city departments and bureaus interested in this problem. During a six-month period, 260,000 cards were distributed to acquaint householders and merchants with the provisions of the laws and ordinances. As a rule the inspectors, in addition to leaving a card, explained these regulations to the householder. Generally speaking, cooperation was

given willingly, but where persistent violations continued, drastic measures were necessary. In 1922, 550 persons were penalized after having refused to comply with notices. The street-cleaning division reports that it encountered much political interference which hampered the efforts of the inspectors. It was found that some magistrates were sympathetic with so worthy an undertaking, but that others apparently were not.

After this concentrated effort at education and law-enforcement, the work was continued by the individual inspectors. To produce lasting results, however, an intensive campaign must be maintained for many months, and it may be found advisable to continue educational efforts indefinitely. The seed should be sown in the rising generation, and the division of street cleaning should have the means of carrying out a thorough educational program which would include bringing the subject before children in the schools and before all organized groups. To meet existing conditions, the division of street cleaning should use a large force of inspectors clothed with police authority so that arrests may be made on sight without the formality of obtaining a warrant.

Inadequacy of Laws and Ordinances

The handling of refuse by the householder is regulated in part by city ordinance and in part by acts of the state legislature. Among the ordinances of council may be mentioned the one of July 16, 1909, which prohibits the placing of rubbish in receptacles containing ashes.

Because of the inability of the city to impose effective penalties, however, ordinances of council are difficult to enforce. The penalties that may be imposed consist only of fines, and the violator cannot be held for non-payment of a fine. Fines which are not paid when imposed must be collected by means of a civil suit brought by the city, and the relatively small amounts involved make it unprofitable for the city to undertake collection. Sometimes the offender is put to no other inconvenience than that of attending a hearing, although it lies within the discretion of the magistrate to hold the violator under arrest pending the hearing. For these reasons the city ordinances have not been a great aid to refuse-disposal work.

A state law prohibits the throwing of refuse into the streets and picking over or disturbing the contents of refuse receptacles

placed on the street for collection. This law should be used to eliminate the scavengers who create unsatisfactory conditions by their operations. There is also a state law, approved June 3, 1915, under the authority of which the city board of health has established regulations concerning the receptacles to be used for garbage and ashes, and the bundling of rubbish. These regulations are as follows:

> ASH RECEPTACLES: Shall be substantial, tight containers, preferably of metal, and should not have a capacity of over five cubic feet; and they should not be filled higher than three inches below the top of the receptacles.
>
> RUBBISH, WASTE PAPER AND LIKE REFUSE: Shall be securely bundled or placed in tight receptacles in such a manner as to prevent them from causing a nuisance upon the property or upon the street.
>
> GARBAGE RECEPTACLES: Shall be of metal, tightly made, and shall be covered with close-fitting covers.
>
> PENALTY: For the first violation of this law, five (5) to fifty (50) dollars. For the second violation of this law, twenty-five (25) to two hundred (200) dollars, or sixty (60) days or less imprisonment, or both.

Cooperation in Street Cleaning

It may seem absurd to suggest that the public cooperate with the municipal forces in their effort to keep the streets clean. The refuse which accumulates on the streets is frequently looked upon as the inevitable accompaniment of city life, and the only effort considered necessary on the part of the public is to provide funds for removing it. There is, however, much promiscuous littering of the streets which could be avoided. The citizen should be so impressed with the importance of his cooperation in keeping the streets clean that refuse will be placed in receptacles at home, when this is possible, or in receptacles placed in the street at city expense. Several hundred containers for this purpose are now in use about the city; but this number is insufficient, and should be greatly increased in order that the municipal government may meet the citizen more than half way in eliminating street litter.

The Householder's Handicap

There are few American cities in which so serious a handicap has been placed upon the householder as in Philadelphia. It would almost appear that the intention in home construction in the past has been to make it difficult for the householder to dispose of waste. Yet, in the average home, over two and one-half tons of ashes, rubbish, and garbage are handled each year. Team alleys, which would permit the placing of refuse at the rear of properties for collection, are rare except in newly developed sections. In the prevailing solid-row houses, there is usually no entrance to the cellar from the front street. It is, therefore, necessary to use the cellar windows or carry the refuse upstairs, through the house, into the street. Under these conditions there is no encouragement for the use of large receptacles, for they either will not go through the cellar window or they are too heavy or cumbersome to carry through the house. Accordingly, smaller receptacles are favored by the householder, and every kind of small container finds its way into use—the wooden box, pasteboard containers, peach baskets, grape baskets and many others. More frequently leaky than tight, these receptacles leave a trail through the house and upon the street, while papers and rubbish which are not securely bundled or packed, or which have been pulled out by scavengers, are blown about by the wind. The conditions thus created in the street can be imagined better than described. No matter how carefully this material may be loaded, many streets, after the weekly collection, particularly on a windy day, present a very disorderly appearance. The street-cleaning gang which follows the collection wagons has no easy job in removing the dirt from the street and the litter from the sidewalk.

The separation of household waste into three classes, which is necessary if the value of these wastes, particularly garbage, is to be conserved, is in many ways inconvenient for the householder. Unwillingness to follow troublesome regulations probably accounts for the small extent to which householders make this separation. In planning for the future collection and disposal of refuse, the city should give careful consideration to the difficulties of obtaining separation of wastes in the household, and should endeavor to simplify the collection service. If garbage is to be incinerated, merely draining and wrapping it in paper for collec-

tion may be sufficient to permit its collection with the rubbish. For the present, however, the greatest possible cooperation from the householder is necessary, even though he labors under a handicap. The demands upon the householder should not be burdensome simply to permit of undertaking profitable methods of refuse disposal. Since the citizen pays for the service from collection to final disposal, he may feel that greater convenience might well be obtained at some slight financial sacrifice.

Conclusions and Recommendations

Experience has shown that the public, in general, does not cooperate readily in the work of keeping the streets clean and of collecting and disposing of refuse. Such cooperation is essential if the work is to be done in the most efficient and economical manner. It is, therefore, important that a determined effort be made to educate those who impede the work through ignorance or carelessness, and to force compliance from those who wilfully refuse to do those things which they are able to do and which the general interest demands that they do.

The necessary funds and personnel to conduct an effective campaign of public education in methods of assisting the work of the division and of keeping the cost at a minimum should be furnished the division of street cleaning. Such a campaign should be continued as long as it is needed. Those who will not comply willingly after they have been instructed should be forced to do so. To that end, the laws, ordinances, and regulations should be adequate to effect the desired results, and should be capable of strict enforcement. The division should be able, through its own employes, to obtain compliance with the regulations.

It should be remembered, however, that the citizen in Philadelphia is handicapped by conditions which often render it difficult for him to handle the household refuse in the most satisfactory way. The restrictions placed upon him should therefore be adapted to the existing conditions in order that unnecessary inconvenience may not be imposed. The householder may consider that his convenience is worth some additional cost of service.

As a result of our survey of the present status of cooperation between the public and the street-cleaning and refuse-disposal services, we recommend that:

1. Adequate funds and personnel be furnished the division of street cleaning to conduct a comprehensive campaign to instruct the public in the best methods of handling household wastes and of cooperating with the work of the division.

2. The division of street cleaning be provided with effective means of enforcing compliance with regulations established for the benefit of the service.

3. An effort be made to institute regulations which shall stipulate clearly the methods to be used, and which shall be capable of ready and effective enforcement.

APPENDIX

Memorandum by the Bureau of Municipal Research of Philadelphia In Regard to a System of Accounting and Cost Keeping for the Division of Street Cleaning, Bureau of Highways, City of Philadelphia

May 15, 1923

The accounting system of the division of street cleaning should show, among other things, the assets, liabilities, expenses, expenditures, and income of the division. It should be operated on the double-entry principle, and control should be exercised through a general ledger.

An account should be kept for each item of permanent property; and each of these accounts should show the date of acquisition, the cost, the rate and basis of depreciation, the accumulated amount of depreciation, and the net book value. These accounts may be kept either in the general ledger or in subsidiary ledgers. If they are kept in subsidiary ledgers, one or more controlling accounts should be maintained in the general ledger.[1]

Accounts should be kept for stores; all stores received should be charged to the appropriate stores accounts; all stores consumed should be credited to the stores accounts to which they were charged, and should be charged to the expense, asset, or other account affected by the use of the stores. One or more accounts should be kept in the general ledger to control the various stores accounts.

An account should be kept in the general ledger to show the total expense (or the total expense exclusive of depreciation) of the division. If depreciation is not included in this account, one or more accounts should be kept in the general ledger to cover the depreciation charged to expense. Each distinct class of expense accounts should agree in the aggregate with the expense account (or accounts) in the general ledger.

Suitable accounts should be kept in the general ledger to control each other item of asset and each item of liability and income. These accounts may be in whatever form and detail seems suitable.

[1] Until the time when complete property accounts are kept, depreciation can be determined approximately in the manner employed in table VI-2.

Strictly speaking, assets, liabilities, income, and expense should be recorded on what is known as the accrual basis, rather than on the cash basis. However, since the accrual basis is likely to prove the more complex and laborious in the recording of the expenditures of the street-cleaning division, it will doubtless be more advantageous to use the cash basis. Thus the expenditures would be brought into the general accounts when the payments are made (that is, when the warrants are issued) and the appropriation accounts are charged. The charges to the appropriation accounts resulting from the issuance of warrants would, therefore, be the primary record of the expenditures. The analysis necessary for getting these expenditures on the general ledger could possibly be made on the appropriation accounts, but it will doubtless be found more satisfactory to have a separate warrant register for this purpose and also to make therein one or more other analyses such as are indicated below.

A current check upon the expenditures of the street-cleaning division would be furnished by the monthly statements of the appropriation accounts. It will be necessary, of course, to indicate on those accounts which are used jointly by the highway and street-cleaning divisions the amounts which are chargeable to the latter division.

In addition to the general ledger and the warrant register, a double-entry journal is required to make the double-entry system complete. In the journal would be recorded all transactions other than the expenditures.

The discussion above has referred primarily to the main accounting system. It provides a basis upon which cost accounting can be developed to any degree that is desired. This cost accounting should be tied definitely into the complete record of expenditures. It is suggested that in addition to the primary analysis of expenditures into outlay and expense on the warrant register, these expenditures should be distributed over organization-unit accounts. The type of organization-unit accounts which it is desirable to keep is indicated in the following list, which, of course, can be modified to meet the needs of the street-cleaning division:

1. Stables (upkeep and care of livestock, including activities of the model farm)
2. Wagon Shops (maintenance of wagons and miscellaneous equipment)
3. Garage (storage and maintenance of motor equipment)
4. Dumps (rental and operation of disposal grounds)
5. Destructor Plants (operation and maintenance)
6. Garbage-Reduction Plant (operation and maintenance)
7. Street Operations (direct costs of street cleaning, ash and rubbish collection, garbage collection, snow removal, water transportation, rentals of livestock and equipment, etc.)
8. Storehouse (supplies and materials service)
9. General Administration (directing officials, engineers, clerks, inspectors)
10. Plant and Equipment (including improvements to property)

These unit accounts could be further subdivided into appropriate sub-units (for example, Stables into individual accounts for each stable and for the model farm), and entries could be made in whatever detail is desired (for example, Personal Services according to payroll code resignations).

In addition to the organization-unit accounts, functional accounts could be set up which would to a large extent depend upon the analysis of expenditures by organization-unit accounts. Such functional accounts might be created as:

a. Street Cleaning
b. Ash and Rubbish Collection
c. Ash and Rubbish Disposal
d. Garbage Collection
e. Garbage Disposal
f. Snow Removal
g. Miscellaneous Purposes (such as services for highway division, or for other bureaus or departments)

These functional accounts can be drawn to show costs with or without depreciation, and statements can be prepared from them to cover any desired period (one month, three months, six months, or a year).

This method of building up cost figures is one which furnishes an easy check upon the entire system. Certain control accounts will be provided which in themselves are of value to the administrative officials. The detail cost keeping can be carried to such length as is desired, since the system is susceptible of ready expansion. Several different ways can be employed to set up the proposed system, and many of the ledger records now maintained can doubtless be incorporated into it without very extensive changes.

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